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OFFICE OF EXPERIMENT STATIONS

A. C. TRUE, DIRECTOR

EXPERIMENT STATION RECORD

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[a] Not to be confused with Circular 7, May, 1909, previously noted (E. S. R., 21 p. 306.)

UNITED STATES DEPARTMENT OF AGRICULTURE PUBLICATIONS ABSTRACTED

EXPERIMENT STATION RECORD.

VOL. XXIII. JULY, 1910. NO. 1.

In submitting for the consideration of the House of Representatives the bill making appropriations for the Federal Department of Agriculture for the fiscal year ending June 30, 1911, Hon. Charles F. Scott, chairman of the House Committee on Agriculture, characterized the measure as "unique in the fact that it is almost identical with the estimates submitted by the Secretary; and the estimates are unique in the respect that they are substantially a copy of the existing law. There is no new legislation of importance. There is no change of language which alters in any way the scope or character of the work the Department is doing; and in only three of the bureaus are there changes in the sums appropriated sufficient in amount to call for special comment."

During the progress of the bill through Congress it received the usual extended consideration and a number of amendments were adopted, but in general the Act as finally signed by the President on May 26 remains substantially as described above. There is, however, a net increase of $492,600, or nearly four per cent, over the appropriations carried by the measure for the fiscal year 1910.

Although this increase is somewhat less than that accorded during recent years, it may perhaps be interpreted as no less significant of the continued interest of the people of the country in the work of the Department, and of their realization of the importance of the uninterrupted continuation of its various lines of work. With a view to the avoidance of a deficit in the Treasury during the ensuing year, the estimates of all the departments were, as expressed by President Taft in his annual message to Congress, "cut to the quick," aggregating as a whole over one hundred million dollars less than the appropriations for the previous year. That none of this reduction took place in the Department of Agriculture indicates the general acceptance of the view expressed by Chairman Scott that the Department "bears a relation to the chief industry of our people so direct and vital that to withdraw from any field which it now occupies for so long a time as a year would inflict a money loss upon our people immeasurably greater in the aggregate than the small sum which the most rigid economist would argue should be deducted from this bill."

The total amount appropriated in the Act is $13,487,636. The greater part of the increase is for the Forest Service, which will receive, chiefly in consequence of large additions to the national forests, $351,900 in excess of last year. The remainder is mainly for the Weather Bureau and the Bureau of Plant Industry.

As previously stated, the measure is essentially a duplicate of that of the previous year in its language as well as in its appropriations, and embodies very little general legislation. The Secretary of Agriculture is given specific authority to investigate the cost of food supplies at the farm and to the consumer, and to disseminate the results of such investigations. For the purpose of keeping out diseased animals he may also permit the erection of fences along international boundary lines within the territory of the United States.

A provision was also inserted increasing the maximum salary which may be paid to investigators or others engaged in scientific work from $3,500 to $4,000. Under the previous limit a number of the more experienced investigators have been drawn away from the Department. It is understood that this maximum salary is to be reserved for individuals who distinguish themselves by extraordinary scientific work.

The appropriations for the Weather Bureau reach a total of $1,524,760. This represents a net increase of $16,500 over the previous year, but $15,000 is for the restoration of the Weather Bureau station at Sand Key, Florida, which was destroyed by the hurricane of October 11, 1909. A new clause authorizes cooperation with other bureaus of the Government and with societies and institutions of learning in the dissemination of meteorological information.

The total appropriation for the Bureau of Animal Industry is $1,400,460, of which $623,000 is for the inspection and quarantine work (other than the federal meat inspection which is provided for in a permanent law); $250,000 for the cattle tick eradication campaign; $147,600 for the work of the Dairy Division; $42,000 for the animal husbandry investigations; $50,000 for experiments in animal feeding and breeding, which may be in cooperation with the state experiment stations; $108,000 for investigations of animal diseases and the maintenance of the Bureau experiment station at Bethesda, Maryland; and the remainder for general and administrative expenses.

The Bureau of Plant Industry received one of the few increases in the bill, and has a total allotment of $1,758,206. There is considerable rearrangement of the amounts divided among the thirty lines of inquiry, and some regrouping of the work, but in general the changes are not large. As compared with the present year the appropriation for the boll-weevil campaign shows an increase of $25,155, making $250,155 for the purpose, of which $10,000 is im-

mediately available. There was also an increase of $24,400 in the sum available for the preparation of sets of cotton standards and the investigations of the handling, grading, and baling of cotton.

Among the other groups of projects may be mentioned the farm management investigations, which receive $130,060; studies of the production, improvement, handling, grading, and transportation of grain, which will receive $112,945; methods of crop production in the semiarid or dry land sections, and for the utilization of lands reclaimed under the reclamation act, for which $106,110 is granted; and methods of growing, packing, and marketing fruits and melons, which will have $71,615.

For the Congressional seed distribution, which was continued on the usual basis, $265,710 was granted, an increase of $3,390. The appropriation for the introduction of rare and valuable seeds from foreign countries was made $43,880.

The Forest Service received a total of $5,008,100. This is as usual by far the largest appropriation to any one bureau carried in the bill, and also represents the largest increase made, being $351,900 in excess of the corresponding appropriations for the previous year. The increase is attributed to the recent addition of 26,528,439 acres to the national forests, mainly in Alaska.

The policy of further itemizing the expenditures from the various lump funds, which was inaugurated the previous year for most of the bureaus, was extended to the Forest Service. Instead of a single large grant for general expenses there are definite allotments ranging from $2,405 to $50,644 for the maintenance of each of the 150 national forests, together with $135,000 for fighting forest fires, $221,040 for the purchase of supplies, $129,420 for investigations of methods for wood distillation and preservation and the economic use of forest products, $11,820 for investigations of range conditions within national forests and range improvement, $66,640 for silvicultural experiments in national forests, $108,010 for silvicultural and dendrological investigations, which may be in cooperation with other branches of the Federal Government and with States and individuals, and $115,470 for miscellaneous forest investigations and the preparation and dissemination of the results of the experimental work. The tests of plants and woods as to their suitability for paper making, which have been conducted under a general appropriation, were definitely assigned to the Forest Service, and $14,000, an increase of $4,000, appropriated for the purpose.

The allotment for permanent improvements on the national forests was decreased from $600,000 to $275,000. The time during which dead and insect infested timber from the Black Hills National Forest in South Dakota can be exported from the State, which would have expired July 1, 1910, was extended to July 1, 1912.

The Bureau of Chemistry received $895,700, an increase of $25,000 being granted to provide funds for the expenses of witnesses and inspectors in attending trials under the food and drugs act. The various lines of work of the Bureau are provided for much as at present.

A small increase was also granted to the Bureau of Entomology, $5,000 being added for investigations in this and foreign countries to discover and introduce natural enemies of the white fly. There is some readjustment of the amounts allotted for the several lines of work, $300,000 being provided for the gipsy moth campaign, $40,600 for investigations of insects affecting deciduous fruits, $25,000 for those of cereal and forage plants, $47,000 for those of southern field crops, $14,000 for forest insects, $16,250 for insects on truck crops and stored products, $21,500 for those of citrus fruits, $10,000 for bee culture, and $28,550 for other investigations. The total appropriation for the Bureau, including statutory salaries, is $532,180.

The total appropriation of the Office of Experiment Stations, including $720,000 for experiment stations under the Hatch Act, is $1,067,820, and aside from transfers to other funds is precisely as at present. Of this amount $46,180 is for statutory salaries, $33,400 for general expenses, $99,000 for insular stations, $10,000 for the agricultural educational service, $10,000 for nutrition investigations, $70,380 for irrigation investigations, and $78,860 for drainage investigations. In the case of the drainage investigations a provision was inserted requiring the Secretary of Agriculture to make a special report to Congress at its next session, giving the aggregate expenditures on this work to date and the areas in the several States and Territories which have been investigated.

The section providing for the insular stations was amended to permit the printing of the publications of the Hawaii and Porto Rico stations by the Department instead of in the islands as required at present. A provision permitting of the expenditure of $1,500 from the appropriation for the Guam Station for the purchase of land was omitted, as the land has already been acquired.

An innovation in the legislation affecting the insular stations is a clause added by the Senate under which $5,000 of the $28,000 appropriated for the Porto Rico Station is specifically allotted to experiments relating to the culture of coffee. This will be a continuation of a line of work which has received much attention from the first. In 1899 Porto Rico was swept by one of the most destructive hurricanes in its history and the coffee industry was all but ruined. When the station was established in 1901, experiments were begun on the restoration and improvement of old plantations and to determine the cost of establishing new ones. These investigations have been conducted on the Carmelita estate, where a ten-acre tract was secured to

carry on experiments in thinning, pruning, fertilizing, and cultivating the trees, and on the extent to which shade could be removed.

With a crop like coffee several years must elapse before definite results can be announced. The past season was the sixth since these experiments were begun and the average yield from the experimental plats was 290 pounds of merchantable coffee per acre, as compared with an average of less than 200 pounds for the main crop. In the experiments on establishing new plantations the sixth year has been concluded. The value of seed beds, nursery cultivation, and windbreaks has been demonstrated. In 1909 a second small crop was produced on the new plantation averaging about 100 pounds of coffee per acre. The cost of the plantation thus far has been $101.56 per acre.

The experiments thus far have shown the necessity of thinning, pruning, reduction of shade on established plantations, and cultivation where the contour of the land will permit, if the yield of coffee in Porto Rico is to be brought up to an average that will be profitable. They have also demonstrated the value of seed beds and nursery cultivation in providing vigorous seedlings for new plantings.

In addition to these experiments, about thirty varieties of coffee have been introduced from various parts of the world, with the hope that some may be found better suited to the American taste. A few of the most prized varieties from Arabia and Java have fruited and cup tests have shown that they retain their characteristic aroma and flavor when grown in Porto Rico. As fast as any of those showing superior merit bear seed they are distributed for planting. The station has also been for several years studying coffee soils, insect and fungus pests, fermentation and preparation for market, etc.

It will be seen, therefore, that considerable progress has been made in studies relating to this industry, which is now mentioned in the appropriation act for the first time.

The work of the remaining bureaus has been provided for substantially as at present. The Bureau of Soils receives $231,020, the Bureau of Statistics $220,320, the Bureau of Biological Survey $86,920, the Library $35,320, the Division of Publications $202,730, the Division of Accounts $79,990, the Office of the Secretary $229,870, and the Office of Public Roads $114,240.

To the sums carried in this agricultural appropriation act should also be added the appropriation for the Department printing and binding, for which the usual allotment of $460,000 is included in the appropriation act for sundry civil expenses, an appropriation of $30,000 for the testing of paper-making materials carried in the same act and supplementing the $14,000 granted in the agricultural appropriation act, and the deficiency appropriations of $50,000 for the

Bureau of Chemistry, and $7,700 for additional expenses in the completion of the fencing on the national bison range in Montana, which were authorized earlier in the session. There are also administered by the Department the permanent appropriations of $3,000,000 for the federal meat inspection, and $720,000 for the Adams fund, which next year reaches its maximum under the terms of the Adams Act. These if added to the regular appropriations for the Department would make a grand total of $17,755,336.

The support of agricultural institutions by the Federal Government is also manifested through several agencies not organically connected with the Department of Agriculture. Most prominent are, of course, the land-grant colleges for which large permanent appropriations are provided by the Morrill acts and the Nelson amendment. There are also several small annual appropriations, such as that in the Indian appropriation act of $5,000 to enable the Commissioner of Indian Affairs to conduct experiments on the Indian school or agency farms to test their adaptability, especially as to the introduction of new crops; that carried in the diplomatic and consular appropriation act of $4,800 for the payment of the quota of the United States for the support of the International Institute of Agriculture; and that recently authorized in the urgent deficiency appropriation act for participation in the International Agricultural Exhibition at Buenos Aires, of which $30,000 has been allotted to this Department.

Could all of these various appropriations, some of which are indefinite as to amount, be added together the aggregate would be an imposing sum. Especially under the present conditions do they constitute a substantial and gratifying confirmation as to the importance attached by Congress to the consistent promotion by the Federal Government of both the art and the science of agriculture.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Micro-chemistry, F. EMICH (*Ber. Deut. Chem. Gesell., 43 (1910), No. 1, pp. 10–13*).—A description of general and special micro-chemistry, with particular reference to the work of H. Behrens.

Refractometry and its practical application, D. SIDERSKY (*La Réfractométrie et ses Applications Pratiques. Paris, 1909, pp. 172, figs. 39*).—This volume contains a short description of the more important refractometers and the principles upon which they are constructed. The practical application of refractometers is also considered, and tables therefor are appended.

Studies with the compensation polariscope, J. KOVAR (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 37 (1908), pp. 618–633, 777–794; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 2, p. 108*).—In order to examine substances other than sugars with the compensation polariscope it is necessary to observe the following precautions: The apparatus, when employed with the petroleum light and corlorless solutions, will yield results equivalent to those obtained with the sodium light, if the light from the petroleum lamp is allowed to pass through a strata of potassium bichromate solution which has a thickness of either 15 mm. and a concentration of 1:100, or a thickness of 100 mm. and a concentration of 0.33:100. If these conditions are not adhered to there may be an error of as much as from 4 to 5 per cent. Colored solutions yield results with the compensation apparatus only when the filtered light gives orange-yellow colored fields.

Characteristics of the fat of different animals, M. RAFFO and G. FORESTI (*Gaz. Chim. Ital., 39 (1909), II, No. 5, pp. 444–449, fig. 1; abs. in Analyst, 35 (1910), No. 407, pp. 68, 69*).—The results of analyses of ox, calf, sheep, ass, and horse fat are reported. The determinations made are the saponification number, iodin number, Reichert-Meissl number, Hehner number, melting point, and viscosity value.

A peculiar precipitation of glycogen, E. PFLÜGER (*Arch. Physiol. [Pflüger], 121 (1908), pp. 641–643; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 2, pp. 101, 102*).—Adding 2 volumes of alcohol to 1 volume of glycogen solution yields a milky solution which allows filtration only after the precipitate has settled and the solution has become clear. If the filtration is attempted previous to this very fine particles of the precipitate go through the filter paper. The precipitate, which is a transparent varnish-like body, collects on the bottom and sides of the vessel. The author shows that this phenomenon is not due to the decomposition of the glycogen.

Contributions to our knowledge of plant phosphatids, E. WINTERSTEIN and L. STEGMANN (*Ztschr. Physiol. Chem., 58 (1909), No. 6, pp. 500–505; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 23, p. 891*).—A carbohydrate phosphatid was isolated from the seeds of *Lupinus albus*, which, on analysis, yielded 3.6 per cent of phosphorus, 0.95 per cent of nitrogen, and 16.3 per cent of carbohydrates.

Contribution to our knowledge of cereal phosphatids, E. WINTERSTEIN and K. SMOLENSKI (*Ztschr. Physiol. Chem., 58 (1909), No. 6, pp. 506–521; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 23, pp. 891, 892*).—The phosphatid obtained from wheat flour is a complex mixture of various phosphatids and in addition contains cholesterin, esters of the latter, free-fatty acids, and other compounds. The phosphatids soluble in boiling alcohol also contain, besides such basic substances as cholin and ammonia, some nonbasic nitrogenous bodies. The phosphatids differ both in their physical and chemical composition.

The phosphatids from wheat germs, K. SMOLENSKI (*Ztschr. Physiol. Chem., 58 (1909), No. 6, pp. 522–526; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 23, p. 892*).—Partly mixed and partly uniform substances were obtained. Among them was a body which corresponded very closely to a crystalline compound isolated by Winterstein from wheat flour.

About a peculiar phosphorus-containing body in the leaves of ricinus, E. WINTERSTEIN and L. STEGMANN (*Ztschr. Physiol. Chem., 58 (1909), No. 6, pp. 527, 528; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 23, p. 892*).—From young dried ricinus plants a substance was obtained containing 5.27 per cent of phosphorus and 6.74 per cent of calcium oxid. This is important since no lecithin-like body has ever been isolated from green plants.

A poisonous principle in certain cotton-seed meals, A. C. CRAWFORD (*Jour. Pharmacol. and Expt. Ther., 1 (1910), No. 5, pp. 519–548*).—This investigation has been previously noted editorially (E. S. R., 22, p. 502).

[Chemical, physical, and physiological properties of mowrin], B. MOORE ET AL. (*Bio-Chem. Jour., 5 (1910), No. 1–3, pp. 94–125, figs. 9*).—The results of an investigation of a sapo-glucosid "mowrin" and its acid, mowric acid, obtained from mowrah seeds (*Bassia longifolia*) are presented.

Cellase and the diastasic cleavage of cellulose, G. BERTRAND and M. HOLDERER (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 26, pp. 1385–1387; abs. in Chem. Ztg., 34 (1910), No. 8, p. 61*).—To determine whether during the diastasic digestion of cellulose an enzym different from maltase is active, i. e., cellase, the author studied the action of maltase on cellulose.

The results showed that maltase had no effect, but on acting on cellulose with *Aspergillus niger* cleavage was apparent. The possibility of trehalase and emulsin (sucrase being inactive toward cellulose) being alone active, or of the presence of a new third diastasic enzym, is mentioned.

The enzyms of fermentation vinegar, F. ROTHENBACH (*Deut. Essigindus., 13 (1909), p. 305; abs. in Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 1–3, p. 61*).—Fermentation vinegar contains enzyms but no toxins. Tests made with vinegar essence with reference to its influence on the growth of acetic acid bacteria showed that the growth was either inhibited altogether or that only a slight film was produced on the surface of the liquid.

[Schardinger's reaction with inorganic ferments], G. BREDIG and F. SOMMER (*Ztschr. Phys. Chem., 70 (1910), pp. 64, 65*).—The authors have shown that the metallic catalysts bring about the reduction of methylene blue with formaldehyde with the same ease as does the catalase of milk.

From this work, which was chiefly done with the platinum sole with formaldehyde and formic acid, it is concluded that the electrically prepared colloidal platinum and iridium soles catalyse very actively (at 70° C.) at the same temperature at which the milk enzym is most active. The velocity of the reaction diminishes greatly when the ratio between the formaldehyde and inorganic ferment is too large. This latter fact has already been noted with the milk enzym. The inorganic ferment can also be weakened in the same

manner as the milk enzym by the addition of toxic substances such as mercuric chlorid and hydrocyanic acid.

It was not possible to supplant the formaldehyde by sodium formate, but the addition of the latter to the regular test with platinum was found to accelerate the reduction of the methylene blue. Carbon dioxid was the principal product formed, and in all probability this is due to the oxidation of the aldehyde by the methylene blue. It was also found that formic acid can be employed instead of formaldehyde, but not under the same conditions.

A new method for detecting proteolytic ferments and their antiferments, M. MANDELBAUM (*München. Med. Wchnschr., 56 (1909), No. 43, pp. 2215, 2216; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 23, pp. 903, 904*).—Two methods are described, one of which consists in allowing the ferment to act upon milk agar (composed of 1 part of milk and 2 parts of ordinary agar) in Petri dishes. The other consists in employing milk in Uhlenhuth's tubes.

A new method for purifying peroxidases, N. T. DELEANO (*Biochem. Ztschr., 19 (1909), No. 3-5, pp. 266-269*).—Tests conducted with raphanus extract and colloidal dialyzed iron showed that the latter produced an almost complete precipitation of the proteins without having any effect on the peroxidase activity.

Laboratory methods for organic nitrogen availability, C. H. JONES (*Abs. in Science, n. ser., 31 (1910), No. 791, p. 307*).—The alkaline permanganate and pepsin methods for determining organic nitrogen availability, as used at the Vermont Station on officially collected commercial fertilizers for the past 12 years, are described, and results of these methods on 51 high and low grade animal and vegetable ammoniates now on the market are tabulated and briefly commented upon.

The author concludes that the alkaline permanganate method, while empirical, is nevertheless valuable to eliminate quickly from a large number of samples those of questionable availability which may then be tested by the longer pepsin process and qualitatively to show more in detail the nature of the nitrogen source.

Volumetric estimation of sulphates, A. D. MITCHELL and C. SMITH (*Jour. Chem. Soc. [London], 95 (1909), No. 566, pp. 2198-2201*).—A method is described in which the sulphate is precipitated with barium chlorid, the excess of barium precipitated as chromate, and the excess of chromate estimated by titration with silver nitrate. Ammonium bichromate is used as the indicator, neutral chromates being unstable in solution.

[The quantitative separation of calcium and magnesium in the presence of phosphates and iron], F. H. MCCRUDDEN (*Jour. Biol. Chem., 7 (1910), Nos. 2, pp. 83-100; 3, p. 201*).—This method is particularly applicable to foods, urine, and feces, and where the method of Fresenius and others is inaccurate. It is as follows:

To the calcium, magnesium, phosphate, and iron solution add 2 drops of dilute alizarin solution and then ammonium hydroxid drop by drop, until an alkaline reaction is just obtained. Then add dilute hydrochloric acid drop by drop to the point of acidity, or if the solution has been warmed by the neutralizing process add a few drops of acid to excess acidity and then cool the solution and neutralize again. After this add 10 cc. of twice-normal hydrochloric acid and 10 cc. of a 2.5 per cent oxalic acid solution, bring the mixture to the boiling point, and keep the liquid boiling until the calcium oxalate separates in a granular form. Then add a 3 per cent ammonium oxalate solution drop by drop to the boiling solution, waiting each time until the precipitate becomes coarsely crystalline.

After the precipitate has settled, allow the solution to cool to not above room temperature, and when cold, add to it slowly and with constant stirring 8 cc. of the 20 per cent sodium acetate solution. Allow the solution and precipitate to stand in a cool place from 4 to 18 hours, filter in the cold, and wash with a 1 per cent ammonium oxalate solution until free from chlorids. Dry the precipitate and incinerate with the filter paper in a platinum crucible.

To the filtrate obtained above add 20 cc. of concentrated nitric acid, evaporate almost to dryness, and when no more nitric acid fumes come off add 10 cc. of concentrate hydrochloric acid and again evaporate nearly to dryness. Dilute the residue to about 80 cc., nearly neutralize with ammonia, and cool.

If iron is absent add sufficient sodium acid phosphate (slightly in excess) and ammonium hydroxid, until the solution is alkaline, and finally enough of the latter to make one-fourth of the total liquid. Allow the solution to stand over night, collect the precipitate, and wash free from chlorids with alcoholic ammoniacal solution (1 part of alcohol, 1 part of dilute ammonium hydroxid, and 3 parts of water). Dry the filter and the precipitate and incinerate with a good supply of air.

If iron is present precipitate it with sodium citrate before the magnesium is precipitated.

A titrametric method for carbon dioxid, A. VESTERBERG (*Ztschr. Phys. Chem., 70 (1910), pp. 551–568, figs. 2*).—On the basis of Kuster's work, Winkler's method was rearranged and applied to the determination of carbon dioxid in distilled water, carbonates, mixtures containing carbonates, and in natural waters (both as to free and half-combined carbon dioxid and the free carbon dioxid and carbonate hardness of a water).

Pohl's method for determining the melting point, A. HALLA (*Österr. Chem. Ztg., 13 (1910), No. 3, p. 29*).—The cause for the differing results obtained by various investigators is ascribed to the fact that in some of the cases a thermometer with a pear-shaped mercury bulb was employed. In order to get accurate results with this method the author states specifically that a globe shaped bulb must be used.

A modified method for determining the saponification number, E. RUPP and F. LEHMANN (*Apoth. Ztg., 24 (1909), No. 104, pp. 972, 973; abs. in Ztschr. Riech u. Geschmackst., 2 (1910), No. 4, p. 44*).—In this method the saponification is performed in a stoppered bottle, whereby the loss by evaporation is practically excluded and the apparatus employed is simplified.

Separation of saccharose and lactose by the Bulgarian ferment, L. MARGAILLAN (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 1, pp. 45–47*).—The author was able to confirm the conclusions of Bertrand and Duchacek, that with the Bulgarian ferment it is possible to ferment practically all the lactose without attacking the saccharose. The possibility of employing this method in the analysis of condensed milk is mentioned.

Methods for estimating cellulose, M. RENKER (*Ztschr. Angew. Chem., 23 (1910), No. 5, pp. 193–198*).—Eighteen methods for determining cellulose were investigated. The materials used were jute, sulphite cellulose, wood, and cotton.

From the results the author concludes that a modification of Cross and Bevan's chlorination method (E. S. R., 13, p. 916) yields the best results. The method dissolves little real cellulose and does not include the lignin in the estimation.

Cause of low results in glycogen analysis with dilute alkali, G. FRANCKE (*Über die Ursachen, Weshalb die Glykogen Analyse bei Anwendung Verdünnter Kalilauge ze Niedrige Werte Geliefert Hat. Inaug. Diss., Univ. Bern, 1909, pp. 37*).—Concentrations of from 1 to 2 per cent of alkali do not change or

decompose the glycogen in organs. The losses when using such dilute alkali for dissolving organs for glycogen determination are explained by the fact that the dilute alkali, in contradistinction to 30 per cent alkali, does not so change the protein as to allow a complete precipitation of the glycogen.

Influence of the time of heating with strong alkali on glycogen determination, V. HESSEN (*Über den Einfluss, den die Zeit der Erhitzung mit Starker Kalilauge auf die Quantitative Analyse des Glykogenes Ausübt. Inaug. Diss., Univ. Bern, 1909, pp. 45*).—With an alkali concentration of 30 per cent the same results were obtained on heating for ½, 1, 2, or 3 hours. It is, therefore, considered evident that heating glycogen-containing organs for ½ hour suffices for their complete solution. The only precaution which is necessary is to remove the flask from the water bath every 5 or 10 minutes and agitate it.

The quantitative estimation of formic acid, H. FRANZEN and G. GREVE (*Jour. Prakt. Chem., n. ser., 80 (1909), pp. 368–389; abs. in Ztschr. Angew. Chem., 23 (1910), No. 5, p. 224*).—A method is described in which the formic acid in bacterial culture solutions is extracted by distillation, and the estimation made by a gravimetric method based on the observation that the formates have the property of reducing mercuric salts to the mercurous state.

Albert's method for soil acidity, H. SÜCHTING and T. ARND (*Ztschr. Angew. Chem., 23 (1910), No. 3, pp. 103–106*).—As the result of making comparative tests between Albert's rapid method and that of Tacke-Süchting (E. S. R., 21, p. 9) the authors conclude that Albert's method is not reliable. It is further stated that the reason Albert obtained unfavorable results with the Tacke-Süchting method (E. S. R., 20, p. 1113) was because of an error in titrating the carbon dioxid according to the method of Winkler.

[Albert's method for soil acidity], ALBERT (*Ztschr. Angew. Chem., 23 (1910), No. 3, pp. 106, 107*).—This is a reply to the above, in which it is stated that the results obtained with the author's method are as reliable as those obtained by that of Tacke and Süchting. The author draws attention to the fact that care must be exercised with his method not to use an excess of ammonium salt and barium hydroxid solution. His researches are to be continued.

Pentosans in soil, O. SCHREINER and E. C. SHOREY (*Abs. in Science, n. ser., 31 (1910), No. 791, pp. 308, 309*).—Ten soils containing various amounts of organic matter were submitted to the official method of pentosan determination.

The results obtained lay between 0.005 and 0.275 per cent. There was no relation between the total carbon and pentosan carbon evident. From the soil containing 0.275 per cent of pentosans the authors obtained, on precipitating the sodium hydrate soil extract with alcohol, a dark gummy substance which yielded a pentose sugar on hydrolysis.

Examination of water, W. P. MASON (*New York, 1910, 4. ed., rev., pp. V+167, pls. 3, figs. 10, maps 2*).—This is the fourth edition of this work (E. S. R., 18, p. 7), and contains both chemical and bacteriological methods. The preface states that a special effort has been made to have the methods conform to those proposed by the American Public Health Association.

Iodo-eosin as a test for free alkali in dried-up plant tissues, A. C. HOF (*Bio-Chem. Jour., 4 (1909), No. 3–4, pp. 175, 176; abs. in Zentbl. Gesam. Physiol u. Path. Stoffwechsels, n. ser., 4 (1909), No. 23, p. 911*).—The author recommends a solution of iodo-eosin in ether as an indicator of the presence of free alkali.

Judging of corn and its products, J. SCHINDLER (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), Nos. 11, pp. 721–756; 12, pl. 1*).—A discussion of corn and corn products, with special refereuce to their use as food. Methods of analysis

and standards are given, and a plate illustrates the machinery for handling the different products.

Judging cakes with the protein content declared, KÜHL (*Pharm. Zentralhalle, 51 (1910), No. 4, p. 65*).—A critical discussion based on analytical data. In the author's opinion a minimum nitrogen content should be determined, since reliance can not be placed on insufficient qualitative examinations.

The ferments of honey and their value for judging honey, A. AUZINGER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 2, pp. 65–83*).—The author proposes determining the range of activity for the catalase, diastase, oxidase, peroxidase, and reductase in honeys as a means for judging their quality. The titrating of acidity with one-fourth normal sodium hydrate is also recommended. Eighty-three honeys were tested.

Detection of cocoa shells in cocoa, A. GOSKE (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 3, pp. 154–158*).—A method is proposed in which 5 gm. of the cocoa is dried for 4 hours at 100° C. and extracted with ether for 16 hours to remove the fat, when 1 gm. is treated with a calcium-chlorid solution, specific gravity 1.535, at 30° C. After centrifuging the cocoa-calcium-chlorid mixture the cocoa separates into 3 layers, of which the lower one contains the cocoa shells and some cotyledons. The upper layers are poured off and the residue washed repeatedly with hot water and brought on a Gooch crucible where it is dried and weighed.

A microscopic examination is made of the residue.

About the detection of benzoic, cinnamic, and salicylic acids in wine, C. VON DER HEIDE and F. JAKOB (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 3, pp. 137–153*).—This is a study of methods, particularly of the various means for identifying the respective acids.

"Protective" action of the colloids in milk, with some ultramicroscopic observations, J. ALEXANDER and J. G. M. BULLOWA (*Arch. Ped., 27 (1910), No. 1, pp. 18–25, figs. 2; abs. in Jour. Amer. Med. Assoc., 54 (1910), No. 10, p. 818*).—According to the authors, the casein of milk is an irreversible, or coagulating or unstable colloid, which is protected by lactalbumin, a reversible or stable colloid. In modifying cow's milk for infant feeding it is necessary not only to consider the percentage of total proteids, fat, etc., present, but also to see that the casein is adequately protected. It is emphasized that in cow's milk the casein exists in an already formed higher degree of colloidal aggregation. A mere chemical analysis, not taking into consideration the principle of collodial protection, is in their opinion, an insufficient criterion of the actual digestibility or availability of food.

Analyses and composition of milk and its products, E. GUDEMAN (*Abs. in Science, n. ser., 31 (1910), No. 791, p. 308*).—Analyses of milks from different localities and at different seasons are reported, together with a discussion of the change of ratio between fat and solids-not-fat, and the influence on the composition of concentrated milk products, evaporated and condensed milks and milk powders, as well as of the influence of heating milks of various composition during pasteurization, sterilization, and concentration.

The composition of milk, H. C. LYTHGOE (*Abs. in Science, n. ser., 31 (1910), No. 791, p. 308*).—The sugar in milk is a practically constant factor, while the other constituents vary. This factor may be employed in detecting skimmed or watered milk.

After making the total solids and fat determination the calculation of the protein content may be made by the Van Slyke or Olson formulas. With skim milk the calculated protein will be too low, and the sugar, estimated by difference (taking the ash content to be 0.7 per cent), will be found to be too high.

In pure milk the calculated sugar content varies from 4.2 to 4.8 per cent. In the case of watered milk the calculated sugar content will be too low.

A study of the newer methods for detecting watered milk, G. CORNALBA (*Ann. Falsif., 2 (1909), No. 14, pp. 529–534*).—Comparisons are made between the author's method, previously noted (E. S. R., 20, p. 419), and the cryoscopic and refractometric methods. The author concludes that his method furnishes as accurate results as either of these methods, and that it has the further advantage of being applicable to milks which contain preservatives and those which are not fresh. See also a previous note (E. S. R., 21, p. 614).

Catalase apparatus for milk (*Molk. Ztg. [Hildesheim], 24 (1910), No. 5, pp. 74, 75, fig. 1*).—This apparatus, designed by Lobeck, is described as a convenient one for determining the catalase content of normal and pathological milk.

Apparatus for determining the various combinations of carbon dioxid in milk, A. BARILLÉ (*Jour. Pharm. et Chim., 6. ser., 30 (1909), No. 10, pp. 452–455, fig. 1; abs. in Chem. Ztg., 34 (1910), No. 7, Repert., p. 30*).—A 2-liter flask having a double bored cork is placed in a water bath. In one of the borings is inserted a funnel which has its internal tubal portion ground rough. Into this is inserted a rubber stopper which also has a boring through which is passed a glass tube connected with a gas wash bottle containing alkali. In the second boring of the 2-liter flask is placed the tube of a Liebig condenser, which in turn is connected with an empty gas wash bottle, a series of 2 test tubes containing ammoniacal barium water, and another bottle containing limewater to serve as an indicator. The limewater bottle connects with the air suction pump.

A new method for examining cream, HESSE (*Molk. Ztg. [Hildesheim], 24 (1910), No. 7, pp. 107, 108, fig. 1*).—An apparatus is described which is a combination of a pipette and butyrometer and is designated the "pipette-butyrometer." Tests with this apparatus and the Spritz and Röse-Gottlieb methods showed it to be reliable.

Tablet reagents for estimating sugar in animal urine, E. J. MÜLLER (*Untersuchungen über die Verwendbarkeit der Merk'schen Reagenztabletten zur Quantitativen Zuckerbestimmung im Tierharne. Inaug. Diss., Univ. Bern, 1908, pp. 45, pl. 1*).—The author concludes from tests with dog, horse, and cattle urines that Merck's tablet reagents furnish good results.

Agricultural analyses, R. GUILLIN (*Analyses Agricoles. Paris, 1910, pp. 443, figs. 51*).—The first part of this work is devoted to general agricultural analyses, while the second deals with the analyses required in the agrotechnical industries such as starch manufacture, glucose manufacture, distilling, and the manufacture of superphosphates.

Tartaric acid from wine residues, A. JANSON (*Chem. Indus. [Berlin], 32 (1909), No. 22, pp. 719–722; abs. in Ztschr. Angew. Chem., 23 (1910), No. 4, p. 180*).—In addition to the crude tartaric acid obtained from wine residues, the author draws attention to the amount of tartaric acid in the dregs and yeast and proposes a method for its extraction.

Extraction of oil from Chinese oil beans, L. HOFFMANN (*Seifensieder Ztg., 36 (1909), pp. 1357, 1358; abs. in Chem. Zentbl., 1910, I, No. 1, p. 67*).—In the smaller Chinese oil mills the moist beans are exposed to a pressure of from 30 to 60 kg. for about 6 hours. Hankow beans containing about 14 to 16 per cent of oil yield by this method 9 to 10 per cent of a yellow fluid oil, which has a saponification number of 190. The refining of this oil is done in the same manner as with cotton-seed oil.

The method for extracting the oil in Europe is also described.

METEOROLOGY—WATER.

The value of weather forecasting in agriculture, W. R. DUNLOP (*Agr. Gaz. [London], 71 (1910), Nos. 1882, p. 87; 1883, pp. 105, 106, figs. 4; 1884, pp. 129, 130, figs. 3; 1885, pp. 153, 154, figs. 2; 1886, p. 177*).—This article discusses in a popular way and in some detail the selection of land with reference to meteorological conditions; farm operations requiring weather forecasts; general weather conditions of the British Isles; the relation of cyclones, anticyclones, and cloud types to weather conditions; thunderstorms; popular weather signs; frost prediction and protection; meteorological instruments; and simple rules for weather prognostication.

The relation of the weather service to the farmers of Tennessee, J. F. VOORHEES (*Tennessee Sta. Bul. 87, pp. 22, charts 13*).—The various meteorological elements are shown by means of charts prepared from observations at from 50 to 60 Weather Bureau stations distributed uniformly over the State. The records from which the charts were prepared in most cases cover a period of at least 13 years. The charts show the latest killing frost in the spring and the earliest in the fall, as well as the average date of these frosts, average number of days in the growing season, elevation of the stations above sea level, mean annual temperature, lowest temperature in 13 years, number of winters during that period with zero temperature or below, mean annual rainfall, and monthly distribution of rainfall at the different stations.

The practical value of the meteorological data to the farmer in the selection and location of crops and in deciding upon the time of planting is explained.

Climatology of Italy in its relation with health and with agriculture, preceded by a study of climatic factors in general, G. ROSTER (*Climatologia dell' Italia nelle sue Attinenze con l'Igiene e con l'Agricoltura Preceduta da uno Studio sui Fattori Climatici in Genere. Turin, 1909, pp. XXIX+1040, pls. 13, figs. 68; rev. in Agr. Colon. [Italy], 4 (1910), No. 1, pp. 35, 36*).—This is an elaborate treatise dealing in an exhaustive way with the general climatic and meteorological conditions in different parts of the earth, but especially as observed in their various relations in Italy as a whole and in the different mainland and insular divisions of that country.

An appendix treats of the climatology of the Italian colony at Eritrea, Africa. The data regarding air, soil, and water, which are presented in great detail, are correlated with economic conditions such as health and disease, distribution of population, vegetation, and methods of culture.

Compensation between types of simultaneous seasons in different regions of the earth, H. H. HILDEBRANDSSON (*K. Svenska Vetensk. Akad. Handl., 45 (1909), No. 2, pp. 11, pls. 4*).—In previous papers (E. S. R., 22, p. 615) the author has shown a certain climatic compensation between different regions of the earth and a correlation between the condition of the arctic ice and the following season in parts of northern Europe.

The present paper presents a study of meteorological conditions at points on the east coast of North America and in northern Siberia which shows that conditions, for example at North Cape, furnish a basis for prediction of subsequent conditions in Iceland, the west coast of Greenland, and Newfoundland, and that the summer temperature at North Cape is in opposition to that which may be expected on the Continent of Europe the following spring.

Dependence of some geographical factors on the barometric relief of the earth's surface, P. I. BROUNOV (*Separate from Trudui Obshch. Zeml. Imp. St. Peterb. Univ., vol. 2; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 599, 600*).—A direct relation between atmospheric pressure

and elevation is traced. Disintegration of rocks has apparently proceeded more rapidly in areas of low pressure and thus produced lower reliefs.

On the diurnal heat exchange in a layer of snow on the ground, T. OKADA (*Tôkyô Sûg. But. Kizi [Proc. Tôkyô Math. Phys. Soc.], 2. ser., 4 (1908), No. 18, pp. 358–367; abs. in Beibl. Ann. Phys., 33 (1909), No. 23b, p. 1433*).—Hourly observations on temperature at the surface and at depths of 5, 10, 20, and 30 cm. in snow during 8 days in February, 1907, at two places are recorded. At a depth of 30 cm. the daily temperature variation was only 0.4° as compared with 19° on the surface. The heat exchange at this depth was 12 gram-calories at one place of observation and 20 at the other, corresponding in a general way with those found by Homèn in sand and moor soils. The exchange on cloudy days was about half that observed on clear days.

Monthly Weather Review (*Mo. Weather Rev., 38 (1910), Nos. 1, pp. 1–168, figs. 11, charts 33; 2, pp. 169–328, fig. 1, charts 33*).—In addition to the usual climatological summaries, weather forecasts and warnings for January and February, 1910, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts, these numbers contain the following special papers:

No. 1.—The Weather and the Plant Pathologist, by D. Reddick; Effects of Low Temperatures on Citrus Trees and Fruits (illus.), by A. J. Mitchell; The Topography and Rivers of Lower Michigan (illus.), by C. F. Schneider; Work Undertaken at the Fremont Forest Experiment Station in Climatology and Forestry (illus.), by L. H. Daingerfield; Relation of the Farmer to the Weather Bureau, by L. A. Merrill; Precipitation, Run-off, and Evaporation in the Owens Valley (illus.), by C. H. Lee; The Owens Valley and the Los Angeles Aqueduct (illus.), by A. B. Wollaber; and Floods in Southern California (illus.), by A. B. Wollaber.

No. 2.—Snowfall of the Winter, 1909–10, in New York, by G. W. Mindling; Topography and Drainage—West Shore of Lake Michigan, by H. B. Hersey; Evaporation and Precipitation Measurements at Provo, Utah, by J. L. Lytel; Studies on the Phenomena of the Evaporation of Water over Lakes and Reservoirs, V and VI, by F. H. Bigelow; and Report on Evaporation at Birmingham, Ala., 1909 (illus.), by W. F. Lehman.

Meteorological summaries for the year 1908 (*Kentucky Sta. Rpt. 1908, pp. 504–506*).—Summaries are given of observations at Lexington, Ky., on temperature, pressure, precipitation, cloudiness, and wind movement.

Division of meteorology, N. HELME (*Rhode Island Sta. Rpt. 1909, pp. 173–189*).—Observations at Kingston on temperature, precipitation, prevailing winds, and general character of the weather are given for each month of the year ended June 30, 1909. The mean temperature for that period was 49.3° F., the precipitation 51.2 in., and the number of clear days 149.

The weather of 1909, D. V. LANDRY (*Rpt. Agr. New Brunswick, 1909, pp. 11–18*).—Summaries of observations on sunshine and temperature at Fredericton and other places in New Brunswick are given.

Meteorology (*New Zeal. Off. Yearbook, 1909, pp. 497–504*).—Observations on temperature, atmospheric pressure, rainfall, and wind at 15 stations in New Zealand during 1908 are tabulated.

Meteorological records (*Victorian Yearbook, 29 (1908–9), pp. 588–591*).—Tables show the average rainfall of 1906, 1907, and 1908 in each of 26 districts of Victoria, Australia, as well as the principal meteorological elements for the year 1908 as compared with the average for 52 years, and averages and extremes of climatic elements for the seasons and for the meteorological year as deduced from the records obtained at the Melbourne Observatory.

Is South Africa drying up? F. H. BARBER (*Agr. Jour. Cape Good Hope, 36 (1910), No. 2, pp. 167–170*).—The impoverishment, detrition, and denudation which have occurred in certain fertile river valleys as a result of overstocking are described.

The occurrence of ground water, C. MEZGER (*Jour. Gasbeleucht., 52 (1909), pp. 476–479; 497–500; abs. in Wasser u. Abwasser, 2 (1909), No. 2, pp. 86, 87; Ztschr. Angew. Chem., 23 (1910), No. 7, p. 327*).—This article discusses the drainage and condensation theories of the origin of ground and spring waters, but especially the bearing of variations in vapor tension in the soil and the atmosphere and the conditions causing such variations on the level of ground water and flow of springs. Other factors affecting the rise or fall of the level of the ground water are also considered.

Soil culture from the point of view of the underground water supply and the water requirements of cultivated plants, HITIER (*Bul. Soc. Agr. France, 1909, Dec. 1, pp. 360–366; abs. in Rev. Gén. Agron., n. ser., 4 (1909), No 12, pp. 481–484*).—This is a review of investigations by Houllier (E. S. R., 19, p. 12) from which the conclusion was reached that the lowering of the ground water and the failure of springs in certain parts of France has been due to the extension of the area of clean culture and has not resulted from diminished rainfall, deforestation or internal erosion of soils.[a]

Some notes on artesian and other water supplies, L. C. GREEN (*Queensland Agr. Jour., 24 (1910), No. 3, pp. 103–105, pls. 2*).—The conditions necessary for the occurrence of artesian water are briefly explained and the occurrence of such waters in Queensland is described.

Analyses of mineral waters, S. D. AVERITT and O. M. SHEDD (*Kentucky Sta. Rpt. 1908, pp. 487–503*).—Analyses of samples from different parts of Kentucky are reported.

The process of self-purification of natural water after artificial inoculation with bacteria, E. SCHEPILEWSKY (*Arch. Hyg., 72 (1910), No. 1, pp. 73-90*).—The author concludes from investigations reported in this article that as a rule natural waters have bactericidal properties which enable them to free themselves quickly from bacterial contamination. These properties are ascribed to the presence and growth of protozoa. The purification of the water from bacteria is dependent upon the rapidity of the growth of the protozoa. This in turn results from the stimulating action on the encysted and vegetative forms of protozoa of the soluble products of the autolysis of the bacteria and very probably also of the products of the life activity of bacteria in general.

The sterilization of water by the ultraviolet, E. URBAIN, C. SCAL, and A. FEIGE (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 9, pp. 548, 549*).—Studies of the absorption of ultraviolet rays by quartz, air, and water are briefly referred to and an installation is described by which the authors succeeded in completely sterilizing city sewage by subjecting it to illumination for one minute under an arc of 2 amperes at a distance of 10 cm.

Disposal of Paris sewage by irrigation at Gennevilliers, BOURNEVILLE ET AL. (*Ann. Dir. Hydraul. et Amélior. Agr., Min. Agr. [France], 1908, No. 37, pp. 359–364*).—This is a brief report by the commission having charge of this work and shows the amounts of sewage disposed of by irrigation in the Commune of Gennevilliers during 1903 to 1906, as well as during the first 10 months of 1907.

It is stated that during the first 10 months of 1907 the 815 hectares (2,013.9 acres) of land at Gennevilliers received 41,495,516 cubic meters (53,944,170.8 cu. yds.) of sewage water, corresponding to an annual application of 61,131

[a] See also a previous article (Ann. Div. Hydraul. et Amelior. Agr., Min. Agr. France 1907, No. 36, pp. 38–45, pls. 2, dgms. 2).

cubic meters per hectare (32,174.2 cu. yds. per acre). This is a slightly larger application than that fixed by law but it was readily absorbed and produced no injurious effects. The extension of the irrigated area and the installation of plants for bacterial purification are recommended.

Sewage disposal at Birmingham and Salisbury, England, J. D. WATSON and W. J. E. BINNIE (*Abs. in Engin. Rec., 61 (1910), No. 16, pp. 526–528*).—A system combining lime precipitation, biological purification, and land irrigation employed at Birmingham is described.

SOILS—FERTILIZERS.

Soil fertility and permanent agriculture, C. G. HOPKINS (*Boston, New York, Chicago, London, 1910, pp. XXIII+653, pls. 9, figs. 5*).—In this book, which is the fourth in the Country Life Education Series, edited by Charles William Burkett, and which is dedicated to the Association of American Agricultural Colleges and Experiment Stations, the chief purpose is, as stated by the author, "to bring together in convenient form the world's most essential facts gathered from the field and laboratory, and to develop from them some foundation principles of permanent agriculture," in other words, "to teach the science of soil fertility and permanent agriculture."

The book is based to a large extent upon the fundamental thesis, developed mainly by the investigations of the Illinois Experiment Station, that "phosphorus and decaying organic matter are the two substances which constitute the key to profitable systems of permanent agriculture on most of the normal soils of America; although, when soils become sour, or acid, ground natural limestone should also be regularly applied." The supply of nitrogen for ordinary systems of grain cropping can be maintained by the use of farm manure and the growing and plowing under of leguminous green manures, although commercial nitrogen can usually be profitably used in market gardening and other more intensive systems of farming. Potash salts are needed only on the comparatively limited class of soils which are positively deficient in potash, as for example, certain peaty swamp lands.

The author emphasizes the importance of soil surveys, but also points out the need of more detailed study than is given in ordinary surveys to local soil variations and conditions.

While recognizing that the natural adaptation of soil and crop is an important factor in many cases, the author is of the opinion that this is a matter which has been given undue consideration in comparison with other factors of plant production.

"Even in the common practice of agriculture, soils at first well adapted to the growing of a certain crop do not remain so adapted. The fact is too well known to need illustration that specific crops are often grown with success for years finally to fail and be abandoned for some other successful crops, which in turn finally give way to others. Thus good wheat land finally becomes poor wheat land, but still remains good for timothy hay, which in turn gives way to redtop, and this may be followed by partial abandonment of the land for crop production.

"At any stage in this process of soil depletion the land may be restored to its original power to produce wheat by adopting the proper systems of soil enrichment. . . .

"The most common staple crops can be grown on almost any soil if it is well drained, well watered, and sufficiently rich. Of course, the matter of crop adaptation must not be ignored, but if we would grow either plants or animals, we must not neglect the food supply."

The author's well-known views with reference to the value of finely ground calcium carbonate as compared with quicklime and of insoluble phosphates as compared with soluble phosphates are fully set forth, and the theories of the Bureau of Soils of this Department regarding soil fertility are discussed at length.

The book is divided into four parts, (1) science and soil, (2) systems of permanent agriculture, (3) soil investigations by culture experiments, and (4) various fertility factors. Part 1 contains chapters on foundation facts and principles, the more important elements and compounds, plant food and plant growth, the earth's crust, soil formations and classifications, soil composition, available plant food, soil surveys by the United States Bureau of Soils, soil analyses by the United States Bureau of Soils, crop requirement for nitrogen, phosphorus, and potassium, and sources of plant food; part 2, chapters on limestone, phosphorus, organic matter and nitrogen, rotation systems for grain farming, live-stock farming, the use of phosphorus in different forms, and theories concerning soil fertility; part 3, chapters on the Rothamsted experiments, Pennsylvania field experiments, Ohio field experiments, Illinois field experiments, field experiments in the South including southern Illinois, Minnesota soil investigations, Canadian field experiments, and short-time pot-culture and water-culture experiments in comparison with field results; and part 4, chapters on manufactured commercial fertilizers, crop stimulants and protective agents, critical periods in plant life, farm manure, losses of plant food from plants, losses of plant food from soils, fixation of plant food by soils, analyzing and testing soils, relation of fertility to appearance of soils or crops, factors in crop production, essential factors of success in farming, the value of land, and two periods in agricultural history.

An appendix contains sections relating to the production of phosphate rock, a model fertilizer law, composition of animal and plant products, statistics of agricultural products, methods of soil analysis, composition of some European soils, and agricultural colleges and experiment stations in the United States and Canada. The book also contains an index which adds to its value for reference purposes.

The conservation of the fertility of the soil, H. W. Wiley (*Nat. Conserv. Com. Rpt., 1909, vol. 3, pp. 269–300*).—This is in the main a review of early studies of soil fertility with definitions of soil fertility and a statement regarding the utility of rotation of crops.

Crop yield and soil composition, M. Whitney (*Nat. Conserv. Com. Rpt., 1909, vol. 3, pp. 9–107*).—Substantially the same as Bulletin 57 of the Bureau of Soils previously noted (E. S. R., 22, p. 18).

Whitney's theory of soil fertility, O. Lemmermann (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 50, pp. 739–742, fig. 1; abs. in Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 25, pp. 686, 687*).—The theory is explained and it is stated that it runs counter to accepted principles of fertilization.

The removal of silt from soils by the waters of the Seine, A. Müntz (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 5, pp. 257, 258; Bul. Soc. Nat. Agr. France, 70 (1910), No. 1, pp. 44, 45; abs. in Rev. Sci. [Paris], 48 (1910), I, No. 7, p. 220; Mark Lane Express, 103 (1910), No. 4094, p. 305*).—Estimates are given of the amount of fine soil particles removed by the recent Seine flood from its drainage basin, and the agricultural importance of the data is discussed.

An analysis of a sample of the flood water showed from 140 to 150 gm. of silt per square yard, and it is estimated that the flood carried away from 15,000 to 20,000 tons of soil per day while it lasted. Considered with reference to the whole area of the drainage basin of the Seine in the vicinity of Paris, the

quantity of soil thus removed is insignificant and the danger of loss of fertility from this cause is not serious.

The kaolinizing action of roots on the Roman lava rocks, G. DE ANGELIS D'OSSAT (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 19 (1910), I, No. 3, pp. 154–157*).—Fresh fragments of lava rock were graded by sieves to grains of approximately 2 mm., 1 mm., and 0.8 mm. in diameter. Equal parts of the three sizes were mixed and thoroughly washed with distilled water. One part of the mixture was put into a glass pot and the other into an earthen pot that had been immersed in water acidulated with hydrochloric acid until effervescence ceased. In the earthen pot chaff of meadow grass (Gramineæ and Leguminosæ) was sown. The two pots were protected from rain, watered twice a week with distilled water, and kept under identical conditions for a solar year. At the end of that time the mixture in the pot without plants contained 5.5 per cent of fine earth and a trace of clay, while in the pot with plants the percentage of fine earth was 9.7 and of clay a trifle over 2.

Investigations on the soil, E. J. RUSSELL (*Jour. Southeast. Agr. Col. Wye, 1908, No. 17, pp. 428–433*).—A brief account is here given of the beginning of investigations on the absorptive power of soils for oxygen and on the effect of partial sterilization of soils, as well as of all other problems relating to soil fertility which have been noted from time to time. A list of the author's publications on these investigations is given.

A new form of Dr. Russell's oxidation apparatus for soils, F. V. DARBISHIRE (*Jour. Southeast. Agr. Col. Wye., 1908, No. 17, pp. 229–232, pls. 2*).—A simpler form of apparatus which can be more easily charged and read and yet yields reliable and accurate results is described. See also a previous note (E. S. R., 19, p. 1120).

Nitrification in the soil under different conditions, B. WELBEL (*Zap. Imp. Obshch. Selsk. Khoz. Yuzh. Ross., 1908, No. 9, pp. 1–42; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, p. 532*).—In lysimetric investigations the conditions affecting percolation and aeration differ from those in the field, hence the Ploti Experiment Station took up a study of the reliability of this method of examining the processes of nitrification and of the moisture in the soil of the field and of the lysimeter. The investigations showed that in lysimeters, under fallow culture, the moisture of the soil was considerably less than that of fallow soil in the field, especially in summer, but varies with the time of the year.

The results of all the methods of investigation (vegetation pots, periodical chemical analysis of the soil, data of field experiments and of chemical analysis of the crops) concordantly corroborate the data of the lysimetric investigations as to the increase in the soil of assimilable nitrogen under cultivation of leguminous plants. The lysimetric investigations also showed that the fallow culture and application of manure increased the quantity of nitrate nitrogen in the soil, and this was corroborated by the other methods of investigation.

The nitrogen enriching of soils, A. KRAINSKII (*Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 6–7, pp. 231–235*).—In a series of experiments undertaken to determine the ability of nitrogen-fixing organisms, like Azotobacter, to enrich the soil by the fixation of free nitrogen from the air, the following results were obtained:

(1) The soil can be enriched with nitrogen by the action of nitrogen-fixing bacteria, accompanied by a moderate economic consumption of organic material during the nitrogen assimilation; (2) liquid cultures of Azotobacter consumed from 100 to 200 units of sugar to 1 unit of fixed nitrogen produced; (3) in sand cultures the Azotobacter developed luxuriantly, assimilating large quantities of nitrogen and consuming in the process from 11 to 30 units of carbon to every

unit of fixed nitrogen produced; (4) the great economy in the consumption of organic materials in the soil by nitrogen fixers is to be explained by their symbiosis with autotropic organisms, which, growing in darkness, form organic compounds through the decomposition of carbon dioxid, accompanied by the liberation of oxygen.

The natural solution of the nitrogen question by soil inoculation in sugar beet culture, J. Stoklasa (*Bl. Zuckerrübenbau, 17 (1910), Nos. 1, pp. 1–5; 2, pp. 24–29*).—Inoculation experiments with cultures of Azotobacter and Radiobacter on soils planted to beets are reported, showing decided increases in yield following inoculation. The author concludes from his results that important increases in yield from a practical standpoint may be secured by such inoculation if the soil contains a sufficient supply of suitable carbohydrate food, lime, phosphoric acid, and potash, and is well aerated by proper cultivation.

The cooperation of micro-organisms in the utilization of insoluble phosphates of the soil with higher plants, S. de Grazia (*Arch. Farmacol. Sper. e Sci. Aff., 8 (1909), pp. 436–440; Staz. Sper. Agr. Ital., 43 (1910), No. 2, pp. 179–184; abs. in Chem. Zentbl., 1910, I, No. 4, pp. 294, 295*).—This article deals with studies of various factors affecting the solubility of the phosphates of soils in acids produced by bacterial activity.

It was found that the addition of chloroform reduced bacterial activity and decreased the acidity produced, but at the same time increased the solution of phosphates. This is ascribed to increased enzym action resulting in the hydrolization of the tricalcium phosphate of the culture medium, producing dicalcium and monocalcium phosphate and calcium hydroxid, which neutralized the acidity of the culture.

Soils of Mississippi, W. L. Hutchinson (*Mississippi Sta. Bul. 132, pp. 8, figs. 2*).—This bulletin explains how the fertility of soils may be maintained by proper drainage, good tillage, prevention of surface erosion, and maintenance of an adequate supply of humus in the soil.

Soil experiments on the upland loam of southeast Missouri, M. F. Miller and C. B. Hutchison (*Missouri Sta. Bul. 83, pp. 16, figs. 3*).—The soil on which these experiments were made was located on the typical rolling upland of the Hillsboro group of soils. "The soil is partly of limestone and partly of sandstone origin, free of gravel and of a very fine sandy or silty nature underlaid by yellowish clay loam. The soil on this particular field had been cropped for a number of years and was badly run down."

The experiments were made on 3 series of 5 fifth-acre plats each. The fertilizer treatment consisted of cowpeas; cowpeas and lime; cowpeas, lime, and phosphorus; and cowpeas, lime, phosphorus, and potassium. The rotation of crops was corn, cowpeas, wheat, and clover, the cropping of the series of plats being so arranged that one series was in corn, one in wheat, and one in clover each year.

The experiments showed that the soil was lacking, first, in humus and nitrogen, and second, in phosphorus, but only slightly deficient in potash and lime. There was a striking response to the application of phosphates, especially in the case of clover. The application of lime and of potash and the growing of cowpeas also gave some return.

Specific recommendations for the handling of this soil to increase its productiveness are given.

Soil experiments on the prairie silt loam of southwest Missouri, M. F. Miller and C. B. Hutchison (*Missouri Sta. Bul. 84, pp. 19–35, figs. 5*).—The soil on which these experiments were made was a dark gray loam to a depth of 8 in., underlaid by a silty clay to depths varying from 2 to 3 ft. On account of the fine texture of the soil and the level topography of the country drainage was poor in many cases.

The experiments were made on three series of one-fifth-acre blocks, a 3-year rotation of corn, wheat, and clover being used on each series, but the series were so arranged that one was put in corn, one in wheat, and one in clover each year. The fertilizer treatments tested were cowpeas and phosphorus; cowpeas and potassium; phosphorus and potassium; cowpeas, phosphorus, and potassium; and cowpeas, phosphorus, potassium, and lime. Two plats in each series received no treatment.

The principal facts brought out by the experiments were that the soil is deficient, first, in humus and nitrogen, second, in phosphates, third, in lime, and fourth, in potash. Marked benefit was derived from the use of phosphates and potash particularly, but good results were also obtained from the use of lime and cowpeas in addition to phosphates and potash.

Specific recommendations are given for the treatment of the soil to increase its fertility.

Soil experiments on the rolling limestone upland of southwest Missouri, M. F. MILLER and C. B. HUTCHISON (*Missouri Sta. Bul. 86, pp. 75–94, figs. 5*).—The soil on which these experiments were made "is of limestone origin and contains varying amounts of flint or chert, considerable quantities of which may be found on the surface in large sections of this region. The soil is a reddish brown to gray silt loam, averaging about 8 in. in depth and merging into a yellowish red subsoil, the color and clay content of which gradually increase to a depth of 20 in., where it is usually a bright red containing much soft chert in small pieces. The soil is friable and loose and where the surface flint does not interfere or where it has been picked off and in the areas where the surface rock does not occur it is a very tractable soil. It washes considerably when exposed, due to its texture and the rolling topography."

The arrangement of plats, cropping, and fertilizer treatment was the same as in the experiments noted above.

The results of chemical analysis of the soil as well as of the fertilizer experiments "indicate very strongly the lack of sufficient quantities of both nitrogen and phosphorus. The need for lime is also indicated (although not so strongly), while the application of potassium rarely pays on ordinary field crops. Since the nitrogen of a soil is contained in the humus or vegetable matter, the lack of nitrogen also means a lack of humus."

Methods of handling these soils to increase their productiveness are discussed.

Soil investigations in cooperation with the botanical department on Hazen Bench, Truckee-Carson project, S. C. DINSMORE (*Nevada Sta. Bul. 66, pp. 48–51, pl. 1*).—Analyses and pot and field tests of an alkaline calcareous shale composing the surface soil and of an almost pure sand extending to a great depth over a considerable area under the Truckee-Carson Irrigation Project are reported. The soils were found to be very unproductive but were benefited by the application of barnyard manure, thus indicating the need of humus.

Studies of the needs of Rhode Island soils, H. J. WHEELER (*Rhode Island Sta. Bul. 139, pp. 35–104*).—This is a compilation of material which has previously appeared in various other publications of the station, relating to soil studies at Kingston; soil reactions as affecting potato scab; lack of lime or basic substances in Rhode Island soils; cooperative experiments with lime in different parts of the State; the influence of liming upon deficiencies of phosphoric acid, upon the efficiency of nitrogenous fertilizers, and upon the activity of nitrifying organisms in the soil; methods of applying lime; lime as a liberator of potash; effect of liming upon the humus of the soil; effect of different phosphates on soils; relative deficiencies of potash, phosphoric acid, and nitrogen in Rhode Island soils; treatment of land for the production of hay; cooperative experiments to determine the requirements of Rhode Island soils for

the production of grass; and chemical examinations of certain Rhode Island soils.

Natal soils, E. R. SAWER (In *Cedara Memoirs on South African Agriculture. Pietermaritzburg: Govt., 1909, vol. 1, pp. 7–59, figs. 3*).—This article, which forms part of an elaborate memoir on South African agriculture dealing with the cereals in South Africa, discusses the geology, formation, composition and fertilizer requirements, bacteriological activities, and tillage of typical soils of Natal. As regards origin, the soils are mainly of two classes, granitic and calcareous, the former class being by far the larger.

The low productive capacity and the especially small content of available phosphoric acid in certain of the soils are attributed to deficiency of certain kinds of bacterial activity in the soils. On the other hand, the organisms which fix and transform nitrogen appear to be quite active. The importance of thorough tillage to improve the physical condition of the soils is particularly emphasized.

Analyses of 4 representative hillside soils at Cedara showed that on an average each acre-foot of these soils contains 7,776 lbs. of nitrogen, 5,398 lbs. of phosphoric acid, 6,195 lbs. of potash, and 2,301 lbs. of lime, of which only 174 lbs. of phosphoric acid and 478 lbs. of potash are citrate soluble, and only 7 and 30 lbs., respectively, available for crops grown in the field as shown by practical tests. The soils showed an acidity which would require 8,584 lbs. of lime per acre to neutralize.

In plat experiments on the 4 soils the results showed marked differences in favor of the types containing the higher percentages of fine material. The yields were doubled or trebled on all 4 soils by the use of superphosphate, slag, bone dust, and mixtures of lime and complete fertilizer or lime and superphosphate. Applications of lime alone produced little effect. The action of basic slag and bone meal was less affected by the texture of the soil than that of superphosphate. The latter gave its best results only on fine soil. Basic slag was especially effective on clay soils on account of the excess of lime in the slag.

Studies of the absorptive power and capillary rise of water in soils of different types are reported, showing that these properties are dependent upon and controlled by the size and distribution of the soil particles.

Studies of the accumulation of soluble salts in these soils showed "something of a gradation downwards in the contents of saline matter, which points to the influence of capillary matter accompanied by a concentration on the surface due to evaporation of the water of solution. . . . Very little of the soluble matter obtained was found to be of value to the plant; at the most only a trace of phosphoric acid was obtainable from the filtrate, a minute quantity of potash, and smaller quantities of lime and magnesia. Sodium as carbonate, chlorid, and sulphate predominated in the majority of cases."

The absorptive power of the soils for soluble salts was studied by passing dilute solutions of monocalcium phosphate, magnesium sulphate, calcium nitrate, and potassium sulphate through columns of soil a foot in depth. On an average 92.5 per cent of the phosphoric acid was retained, 60.1 per cent of lime, 55.8 per cent of magnesia, 24 per cent of potash, 23.6 per cent of nitrogen, and 11.7 per cent of sulphuric acid.

Examinations of 12 samples of typical tea garden soils of the coast region showed the most marked characteristics of these soils to be a deficiency of humus and of phosphoric acid. The water-holding capacity of these soils was dependent in part upon the size of the soil particles but to a greater extent upon the amount of organic matter present.

In view of the fact that the soils of Natal as of other parts of South Africa are deficient in phosphoric acid and certain of the alluvial soils are deficient in

lime, analyses are given of the available materials which can be used to supply these deficiencies, including phosphates, limestone, kraal manure, blood meal, and guano.

Investigations of soils, B. C. Aston, (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 457–485, pls. 6*).—This article refers to studies of the humus soils and flora of the southern islands of the New Zealand group, the results of which are to be published later, and reports examinations and pot experiments with samples of tailings from gold mines, with unproductive moor soils, and with soils containing an excess of magnesia and potash salts. Examinations of soils containing various abnormal constituents, such as amethyst, resinous matter, citrate-soluble silica, hydrated aluminum sulphate, and quartz sand, magnesium sulphate, and sodium sulphate, and of several samples of hardpan are also reported.

The mine tailings were found to contain a substance injurious to vegetation, possibly zinc sulphid, which was present in small amounts.

The fertilizer experiments with the unproductive moor soils showed that drainage and heavy applications of lime and phosphatic slag greatly improved the soils. Gypsum was the most effective lime compound in increasing the yield of cruciferous plants on the soils containing an excess of magnesia, but ground limestone was the most effective in increasing the yield of oats and grass. The harmful effect of potash salts was very marked on certain of the soils tested, which contained an abnormally large amount of potash soluble in citric acid. An increase in the yield of fruit resulting from applications of phosphatic fertilizers on plum trees is reported.

Analyses of the soils experimented with as well as of a large number of other samples from different parts of New Zealand are reported, with recommendations as to the fertilizer requirements of the soils as indicated by analysis.

Commercial fertilizers, H. W. Smith et al. (*Rpt. Agr. New Brunswick, 1909, pp. 160–174*).—This article points out the advantages of cooperative purchase and home mixing of fertilizers, giving formulas for different crops and the experience of various organizations in the cooperative purchase and mixing of fertilizers.

The fertility of the soil, J. Dumont (*Jour. Fabric. Sucr., 51 (1910), No. 5, pp. 1, 2; Sucr. Indig. et Colon., 75 (1910), No. 8, pp. 175–179*).—This article briefly discusses various factors of soil fertility, especially emphasizing the importance of humus compounds, and reports experiments with Derome's so-called peptonized organic fertilizer. This material is described as a humate prepared by the treatment of vegetable organic matter with alkaline soda solution. In experiments with soils poor in humus increases of from 18 to 30 per cent in yield were obtained with this material.

Peptonized fertilizers, J. Dumont (*Sucr. Indig. et Colon., 75 (1910), No. 11, pp. 249–252; Betterave, 20 (1910), No. 500, pp. 85, 86*).—Experiments on beets, carrots, potatoes, and grasses with Derome's peptonized fertilizer in comparison with fertilizers composed of superphosphate, potassium chlorid, and dried blood, horn, or nitrate of soda, are reported. The results were very favorable to the peptonized fertilizer.

The utilization of atmospheric nitrogen, particularly for the manufacture of air saltpeter, A. Bernthsen (*Trans. Faraday Soc., 5 (1910), No. 3, pp. 297–305*).—This is an abstract of a paper read before the Seventh International Congress of Applied Chemistry at London, 1909 (E. S. R., 21, p. 531; 22, p. 24).

Potash experiments in eastern Holstein, Kuhnert (*Landw. Wchnbl. Schles. Holst., 60 (1910), No. 9, pp. 159–162*).—Cooperative experiments with rye,

barley, oats, potatoes, beets, and grass are reported, showing in general profitable returns from the use of potash in connection with other fertilizers.

Ground phonolite as a potash fertilizer, S. RHODIN (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 1, pp. 75–80*).—Experiments conducted on 5 Swedish farms with fine-ground phonolite ("potassium silicate") for potatoes and mangels, as well as for top-dressing grass land, failed to show that this material has any value as a potash fertilizer, when applied with sodium nitrate and superphosphate at the rate of 900 or 1,500 kilos per hectare (800 or 1,335 lbs. per acre).

Fertilizer experiments with phonolite meal, H. VON FEILITZEN (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 10, pp. 145, 146*).—Pot experiments comparing phonolite meal, containing 7.35 per cent of potash, and 38 per cent potash salt on potatoes, turnips, and peas grown on low moor soil as well as field experiments with barley grown on raw high moor soil are reported, showing a very low efficiency for the phonolite meal as compared with the potash salt.

A criticism of Wein's experiments with ground phonolite, H. NEUBAUER (*Deut. Landw. Presse, 36 (1909), No. 83, pp. 885, 886*).—The author questions the accuracy of Wein's conclusions (E. S. R., 22, p. 24) as to the availability of the silicate of potash in ground phonolite.

Fertilizer experiments with silicate of potash, E. WEIN (*Deut. Landw. Presse, 37 (1910), Nos. 2, pp. 13, 14; 3, pp. 26, 27*).—In this article the author replies at considerable length to criticisms of his investigations by Hiltner and others (E. S. R., 22, p. 324), and Neubauer (see above).

Pot experiments with silicate of potash, E. WEIN (*Deut. Landw. Presse, 37 (1910), No. 13, pp. 145, 146*).—Experiments with Italian rye grass on sandy and moor soils are reported. In confirmation of the results of previous experiments (noted above) the author found that the effectiveness of the potash silicate varies greatly with the conditions under which it is used and is greatest when thorough aeration of the soil is provided for.

New processes for making superphosphates, V. CAMBON (*Engrais, 25 (1910), No. 9, pp. 243–245*).—Various new forms of apparatus and machinery and their methods of operation are described.

Tests of different kinds of phosphatic fertilizers, J. SCHROEDER and H. DAMMANN (*Rev. Inst. Agron. Montevideo, 1909, No. 5, pp. 239–242*).—The tests were carried on at the experimental fields at Sayago, near Montevideo.

The materials experimented with and their content in phosphoric acid were: Bone meal 30, Thomas slag 20, and superphosphate 12 per cent. The crop was fodder beets. The fertilizers were applied in quantity sufficient to furnish about 90 lbs. of phosphoric acid per acre. The results were practically identical for all the forms of fertilizer used and showed an increase of over 200 per cent in the amount of roots and of over 150 per cent in the dry matter as compared with the yield of the plat receiving no phosphatic fertilizer.

The authors think that the large increase was due to (1) the great lack of phosphoric acid in the soil, and (2) the rapid decomposition of phosphatic fertilizers in that climate due to atmospheric agencies. The authors point out that since the different phosphatic fertilizers give practically identical returns the prices should vary according to the phosphoric acid content.

The behavior of superphosphate in the soil, I. K. GREISENEGGER (*Ztschr. Landw. Versuchsw. Osterr., 13 (1910), No. 1, pp. 1–47*).—Two series of experiments are reported. The first included a series of absorption tests with different types of soils to determine the rate and extent of fixation of water-soluble phosphoric acid in the soils. The other consisted of a series of pot experiments to determine the extent to which the phosphoric acid fixed in the deeper layers of the soil can be assimilated by the roots of plants.

The results of these experiments are discussed in their relation to the results of similar experiments by other investigators. They show that soluble phosphoric acid applied to the soil in the form of superphosphate is fixed in the upper layers of calcareous soil as well as in soil poor in lime in a form insoluble in water, but still readily available to plants. The fixed phosphoric acid tends constantly to become more difficultly soluble. There is no danger of phosphoric acid as applied in the usual way in fertilizers being washed out of the soil by atmospheric precipitation. In order to secure the best results superphosphate should be applied in as finely divided condition as possible. Deep harrowing or plowing in increases the effect. Very small amounts of the phosphoric acid applied on the surface sink deeper than 30 cm. (11.82 in.) in the soil.

The pot experiments showed that in certain cases in which there was no increase of yield following the application of superphosphate there was, however, an influence upon the amount of phosphoric acid taken up by the plant.

The content of phosphoric acid in the drainage water was lower than the solubility of tricalcium phosphate would indicate. It was about 3 mg. per liter in calcareous soils and 2 mg. in granitic soils.

Mineral resources of the United States, calendar year 1908.—Part II, Nonmetallic products (*U. S. Geol. Survey, 1909, pp. 899, pl. 1, figs. 6*).—This is the usual detailed report on this subject. The chapter of greatest agricultural interest is that relating to phosphates (E. S. R., 22, p. 227). In this article the statistics are brought up to the close of the year 1908.

Peat resources of the United States exclusive of Alaska, C. A. DAVIS (*Nat. Conserv. Com. Rpt., 1909, vol. 3, pp. 476–482*).—This article gives substantially the same data as that contained in an article already noted (E. S. R., 21, p. 187).

Lime and limestones, B. C. ASTON (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 190, 191*).—Analyses of a number of samples are reported.

Seaweed as a manure (*Field [London], 115 (1910), No. 2979, p. 165; Mark Lane Express, 103 (1910), Nos. 4093, p. 269; 4096, p. 369*).—Attention is called to the importance and methods of use of seaweed in the production of early potatoes in Ayrshire and Jersey, and evidence as to the fertilizing value of inshore ware and tangle collected on the shores of the Firth of Forth is summarized. This evidence was submitted in a suit brought by farmers to determine the compensation due them for deprivation of rights to collect this seaweed for fertilizing purposes.

Analyses are reported which show that the inshore ware contains about 70 per cent of water, 0.43 per cent of nitrogen, 0.09 per cent of phosphoric acid, 0.9 per cent of potash, and 0.5 per cent of lime; the tangle contains 85 per cent of water, 0.26 per cent of nitrogen, 0.13 per cent of phosphoric acid, 1.58 per cent of potash, and 0.34 per cent of lime. The evidence tended to show that the seaweed was fully equal, if not superior, to barnyard manure.

The garbage question at Paris, MAURECOURS (*Engrais, 25 (1910), Nos. 7, pp. 182–185; 8, pp. 213–216*).—The methods of handling and using Paris garbage are briefly described, particular attention being given to the relative merits of methods of incineration and rendering. It is pointed out that hygienists as a rule favor incineration, while farmers prefer methods of rendering by which the larger part of the fertilizing value of the garbage is made available for use. The author is inclined to favor a combination of the two systems of disposal.

Analyses of the fine powder obtained by systems of rendering which are now in use show fertilizing constituents as follows: 0.6 to 1 per cent of nitrogen, 0.5 to 0.8 per cent of phosphoric acid, 0.4 to 0.6 per cent of potash, and 4 to 6 per cent of lime, indicating that this material is superior in fertilizing value to barnyard manure.

Fertilizers, R. E. Rose and L. Heimburger (*Fla. Quart. Bul. Dept. Agr., 20 (1910), No. 1, pp. 4, 17–26, 36–76*).—The laws and regulations controlling the inspection and sale of mixed fertilizers and cotton-seed meal in Florida are given, with notes on valuation and tabulated analyses of 211 samples of fertilizers examined during the year 1909. Of the 155 samples of complete fertilizers examined, 21 samples were 0.2 per cent or more below guaranty in ammonia, 17 samples in available phosphoric acid, and 25 samples in potash; 69 samples exceeded guaranty in ammonia, 117 in available phosphoric acid, and 102 in potash.

Fertilizer inspection (*Maine Sta. Off. Insp. 19, pp. 28*).—This reports the results of analyses of samples of commercial fertilizers collected in the open market in Maine during the spring of 1909. It also contains statements regarding the chief requirements of the Maine fertilizer law, the source and function of the constituents of fertilizers, and the valuation of fertilizers.

Inspection of commercial fertilizers, H. D. Haskins, L. S. Walker, and P. V. Goldsmith (*Massachusetts Sta. Bul. 131, pp. 87*).—"This bulletin gives a general report of the fertilizer inspection work for the season of 1909. It discusses briefly valuations, retail cash prices, and the wisdom of buying only high-grade fertilizers. General mention is made of fertilizer brands which show a serious commercial shortage, and summaries indicate the average quality of the fertilizers offered. Conversion factors relating to fertilizers are published and the tables of analyses show the detailed composition of the fertilizers sold in the State."

Inspection and analyses of commercial fertilizers on sale in the State, W. F. Hand et al. (*Mississippi Sta. Circ. 30, pp. 31*).—This circular reports analyses and valuations of fertilizers inspected during the season of 1909–10.

Inspection of commercial fertilizers, P. F. Trowbridge (*Missouri Sta. Bul. 85, pp. 39–71*).—This report, made in accordance with the Missouri fertilizer law, covers the year ended December 31, 1909, and contains a list of fertilizer manufacturers and brands offered for sale by them, a comparison of the valuation of fertilizers of the same guarantied composition, analyses of the fertilizers inspected, directions for sampling, and a financial statement.

Fertilizers, B. C. Aston (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 185–189*).—Miscellaneous notes are given on the manuring of pastures and top-dressing of lawns, official inspection of fertilizers, importation of fertilizers into New Zealand, the mixing of calcium cyanamid and superphosphate, and the composition of fish offal ash, jadoo fiber, New Zealand flax waste, rata ash, and soot.

Manure used in Victoria, Australia (*Victorian Yearbook, 29 (1908–9), pp. 646–648*).—Statistics of the use of natural and artificial manures during the years 1898 to 1908 are given.

It is shown that in 1908, 235,492 tons of natural manure and 64,715 tons of artificial fertilizer were used by 24,437 farmers on an area of 2,053,987 acres, as compared with 143,586 tons of natural manure and 16,052 tons of artificial fertilizer used by 7,318 farmers on an area of 225,830 acres in 1898. The principal features of the fertilizer inspection act of Victoria are explained.

AGRICULTURAL BOTANY.

The transpiration and the ascent of water in trees under Australian conditions, A. J. Ewart and Bertha Rees (*Ann. Bot. [London], 24 (1910), No. 93, pp. 85–105, dgms. 5*).—In a previous paper (E. S. R., 20, p. 225) one of the authors shows that the ascent of water under the conditions of his experiments is a kinetic problem rather than a static one. He has continued his observa-

tions in Australia to determine the rate of transpiration under Australian conditions, the rate of ascent of sap, especially in eucalyptus trees, the condition of conducting tissue during active transpiration, and the resistance to flow in stems.

It was found that the rate of evaporation per square meter of leaf surface from cut branches, whether placed in water or not, is always less than from a plant rooted in the soil. When the air is hot and dry the evaporation from a free surface of water undergoes an enormous increase, but from a living plant it undergoes a regulatory decrease, in which case it may become only one-sixth as much as from a free water surface. Cut trees were found to absorb water at a less rate than rooted ones evaporated it. The maximum rate of ascent of sap noted was 12.3 meters per hour in *Eucalyptus viminalis*. In cut branches of other species of Eucalyptus and in cut acacia trees it rarely exceeds 1 to 2 meters and is often less than 1 meter per hour. Branches containing air and taken from transpiring trees showed a much greater resistance to flow than when saturated with water. To produce the transpiration rate of flow a head of water 2 to 10 times the length of the stem may be required, but in fully saturated stems with large long vessels a head of one-fifth the length of the stem may be sufficient.

An experiment showed that a colored liquid would rise slowly in a saturated stem kept in a saturated atmosphere, but somewhat more slowly if the stem was killed, indicating that the phenomenon is not the result of any vital pumping action that is not capable of a physical explanation.

No appreciable rise of sap was found to take place in trees deprived of their leaves, a pumping action being excited only when the leaves are exerting suction on the water in the wood.

Influence of light on the expanding of the buds of woody plants, W. LUBIMENKO (*Izv. Imp. Akad. Nauk* (*Bul. Acad. Imp. Sci. St. Pétersb.*), *6. ser.*, *1910*, *No. 2*, *pp. 163–168*).—In a previous publication (E. S. R., 20, p. 1124) the author showed that the intramolecular nutrition of plants, independent of photosynthesis, is regulated by the amount of illumination received. His previous experiments have been extended to include the effect of light on the opening of buds. Branches of lilac, beech, linden, white birch, and oak were placed under bell jars, and by means of various layers of paper the illumination was regulated or reduced.

Light was found to stimulate the development of buds after their winter rest even when the illumination was reduced to such an extent that it could not have any photosynthetic power. In the case of lilac and beech there seemed to be an optimum of light, after which the development was retarded. The expansion of the linden, birch, and oak buds took place very slowly in reduced light, these species demanding a considerable amount of light for their development.

It is claimed that the experiment shows that the buds of woody plants require a period of preparation before their expansion and that during this period a certain amount of light is necessary. When this preparatory period has passed the buds expand in darkness or light. It is held, therefore, that light exerts an indirect influence on the growth of buds.

The action of ultraviolet light on plants, M. CERCELET (*Rev. Vit.*, *33* (*1910*), *No. 842*, *pp. 124–129*).—A résumé is given of various investigations which show the action of the ultraviolet light upon the growth and development of plants.

On the increased growth of persistent leaves, D. DE PERGOLA (*Ann. Bot.* [*Rome*], *7* (*1909*), *No. 3*, *pp. 321–330*, *pl. 1*; *abs. in Bot. Centbl.*, *113* (*1910*), *No. 5*, *p. 115*).—A brief account is given of the author's investigations on the increase in thickness of persistent leaves.

The studies were made almost entirely with leaves of Dicotyledons, and it was found that they increased in thickness with the age of the leaf, due to a considerable development of the palisade parenchyma. This was found in practically all of the species examined, although the rate of growth was not uniform. A similar increase was noted for the fibrovascular bundles.

The transfer of foodstuffs in leaves, with especial reference to their autumn fall, B. SCHULZE and J. SCHÜTZ (*Landw. Vers. Stat., 71 (1909), No. 4–5, pp. 299–352*).—A study was made of the leaves of the box elder from May to the end of September to determine the changes in the transfer of elaborated material from spring to autumn and the effect of light on the elaboration and transfer of foodstuffs.

The fresh and dry weight of the leaves and of many of the substances determined by chemical analysis increased from the beginning of the experiment until the first of September. By the end of September there was observed a marked falling off in the water content and most of the nitrogen constituents, while there was an increase in crude fiber and ash.

In relation to the variation of the morning and evening content, as illustrating the effect of light on food elaboration, it was found in every case observed, except the fat content, that the proportion of constituents present in the leaves in the evening showed an increase over the quantity present in the morning. The fat content fluctuated, being sometimes greater in the morning than in the evening and vice versa. During the last month of the experiment the preponderance was reversed and there was a greater amount of dry matter, protein, fat, and nitrogen-free extract, and less crude fiber and ash in the leaves taken in the morning.

The autumn migration of the various constituents is discussed at some length.

The relation of plants to salts in soils, B. HANSTEEN (*Nyt Mag. Naturvidensk., 47 (1909), No. 2, pp. 181–192*).—A preliminary report is given of experiments with wheat seedlings in water cultures conducted to test the antagonisms supposed to exist between potassium, sodium, and magnesium, and between calcium and magnesium. Different strengths of the individual salts were tested and also the effect of combining them in various ways, particularly with lime, the experiments in every case running for 14 days.

The lime salts when used in less than 0.5 per cent solutions favored the growth of the plants. The other salts when used singly were more or less injurious in proportion to the strength of the solutions, but when used in connection with lime salts the injury to the leaves, roots, and root hairs was greatly diminished, this depending upon the relative proportion of lime to the other salt.

According to the author, lime exerts its antagonistic effect only when used in conjunction with other salts, acting as an external protection to the roots.

The penetration of inorganic salts into living protoplasm, W. J. V. OSTERHOUT (*Ztschr. Phys. Chem., 70 (1910), pp. 408–413, figs. 2*).—The author devised a method for observing the growth of root hairs without injuring them, and by this means was able to observe the formation of calcium oxalate crystals within the root hairs. Seeds of *Dianthus barbatus* were germinated in distilled water, transferred to the special slide, and then placed in solutions of various lime salts. After several hours in the solutions at 30° C. calcium oxalate crystals were observed in the root hairs, showing that the living protoplasm had been penetrated by the inorganic salts without any injury to the cells.

The author states that as the calcium ion can not penetrate without a corresponding anion, it seems highly probable that both the anions and cations, or the undissociated molecules, of the above mentioned salts penetrate the living

protoplasm. If calcium is taken up in this way there is apparently no reason for doubting that the salts of sodium, potassium, magnesium, and iron may penetrate the living cell in the same way.

The photochemical formation of formaldehyde in green plants, S. B. SCHRYVER (*Proc. Roy. Soc.* [*London*], *Ser. B*, *82* (*1910*), *No. B 554*, *pp. 226–232*).—It is stated that considerable criticism has been brought against the various theories regarding the presence of formaldehyde in plants, it being held that, from an experimental point of view, the results are somewhat inconclusive.

The author has made a study of this subject, determining the presence of formaldehyde by a method which is said to be exceedingly delicate. The reaction was found to show the presence of minute quantities of formaldehyde, both combined and free. The author was able to detect formaldehyde in chlorophyll, where it exists in a state of somewhat stable combination. The photochemical synthesis of formaldehyde, it is claimed, can be readily demonstrated. From the fact that formaldehyde exists in a state of combination in chlorophyll, the author claims it is possible to explain how the supply necessary for sugar synthesis in the plant is regulated.

Phytochemical investigations at Kew, M. GRESHOFF (*Roy. Bot. Gard. Kew, Bul. Misc. Inform.*, *1909*, *No. 10*, *pp. 397–418*).—The results are given of a study of about 100 genera of plants in which the author attempted to correlate the relationship of the plants with their chemical composition. The examination was made for the distribution of tannins and alkaloids as well as for hydrocyanic acid and saponin.

Does tannin in the seed coat of barley have any effect on the semipermeability of its membranes? A. REICHARD (*Ztschr. Gesam. Brauw.*, *32* (*1909*), *p. 145*; *abs. in Ztschr. Spiritusindus.*, *33* (*1910*), *No. 6*, *pp. 57, 58*).—After referring to the investigations of Brown (E. S. R., 18, p. 727), in which it was shown that the semipermeability of the seed coats of barley and some other grains was not due to the activity of the protoplasm, the author describes experiments that seem to indicate that it is due, in some degree at least, to the tannin which is present in considerable quantity in the seed coats of barley. Some variation in the permeability was noticed, but this is believed to have been due to insufficient ripeness.

Some notes on cyanogenetic plants, A. W. K. DE JONG (*Rec. Trav. Chim. Pays-Bas et Belg.*, *28* (*1909*), *No. 1–2*, *pp. 24–41*, *fig. 1*).—An account is given of the author's investigations on the occurrence of hydrocyanic acid in the leaves of *Pangium edule* and also of the glucosid yielding this acid in the leaves of *Phaseolus lunatus*.

The investigations showed the presence of the glucosid gynocardine in the leaves of Pangium, but a considerable portion of the hydrocyanic acid is present either in the free state or in a very weak combination. Phaseolunatin was found in the leaves of the beans investigated, the same substance having been previously reported as occurring in the seeds (E. S. R., 15, p. 556).

The rôle of oxygen in the formation of proteids in plants, W. ZALESKI (*Biochem. Ztschr.*, *23* (*1909*), *No. 1–2*, *pp. 150–152*).—It is claimed, from the results of experiments conducted, that oxygen plays no direct rôle itself in the formation of proteids from amino acids in the plants, but may do so indirectly. In the absence of oxygen, proteid formation does not occur and therefore probably all living processes of green plants depend on the presence of oxygen.

The proteases of plants, VII, S. H. VINES (*Ann. Bot.* [*London*], *24* (*1910*), *No. 93*, *pp. 213–222*).—In a previous paper (E. S. R., 17, p. 750) the author gave an account of experiments with malt which led to the conclusion that it contains 2 proteases, a peptase and an ereptase. In the present paper an account is given of investigations of malt diastase and Taka-diastase showing that both

contain proteases which digest vegetable fibrin and produce tryptophane from albumoses and peptones.

The occurrence of rennet in plants, C. GERBER (*Rev. Sci., 48 (1910), I, No. 7, pp. 195–207*).—A critical review is given of literature relating to the occurrence of rennets in plants, their localization, effect of vegetable rennets on milk, relation between rennets and the proteolytic ferments of plants, etc., after which the rôle of rennets in plants is discussed. The author claims that they play an important part in synthesis, in translocation and the storing of reserve proteid material, and in the conduction and nutrition of the pollen tube from the stigma to the ovule.

Inoculation experiments with red clover and serradella, B. STEGLICH (*Jahresber. Landw. Konigr. Sachs., 1908, p. 120*).—Experiments with red clover and serradella were conducted to determine, if possible, the reason for the lack of success when serradella follows red clover in crop rotation. It was found by inoculation experiments that the poor growth of the serradella was due to the injurious action of the clover tubercle bacteria on the serradella.

Remarks on the formation and consumption of nitrous oxid by bacteria, B. TACKE (*Centbl. Bakt.* [etc.], *2. Abt., 26 (1910), No. 6–7, p. 236*).—This is a criticism of the investigations reported by Beijerinck and Minkmann (E. S. R., 22, p. 724). The author claims to have previously shown in an article published in 1887 that nitrous oxid was produced by denitrifying bacteria, and also that nitric oxid was developed from fermenting turnips in a vacuum. After 8 to 10 days it was present in sufficient quantities to form red fumes of nitrogen peroxid when air was admitted to the vessel.

The employment of cellulose as a source of energy for the assimilation of atmospheric nitrogen, H. PRINGSHEIM (*Centbl. Bakt.* [etc.], *2. Abt., 23 (1909), No. 10–13, pp. 300–304; 26. (1910), No. 6–7, pp. 222–227*).—This is a discussion of further investigations (E. S. R., 18, p. 324; 20, p. 18) on nitrogen-fixing bacteria and the various sources of energy available in the assimilation of free nitrogen in the soil.

It is shown that by the association of nitrogen-assimilating Clostridia and cellulose-disintegrating bacteria, the insoluble carbohydrate materials in the form of cellulose, which is unavailable to the Clostridia alone, are made available, thus providing a symbiosis between these two groups of soil bacteria. It is further shown that for the utilization of insoluble carbohydrates, the association of anaerobic bacteria, as Clostridia and cellulose-fermenting bacteria, is better than the association of the aerobic Azotobacter and an anaerobic cellulose-fermenting bacteria; also that in such combinations the cellulose is capable of supplying more energy to the nitrogen-assimilating micro-organisms than the more soluble carbohydrates, like cane, grape sugar, milk sugar, starch, and mannite.

The utilization of the cellulose as a source of energy follows the rule previously laid own for other carbohydrates, that a low concentration of about 0.5 per cent is the best. As a result of these investigations, it is claimed that the presence in the soil of decaying organic matter is of great value in furnishing an available source of energy to nitrogen-assimilating bacteria.

The assimilation of carbon dioxid by hydrogen-oxidizing bacteria, A. J. LEBEDEFF (*Ber. Deut. Bot. Gesell., 27 (1910), No. 10, pp. 598–602*).—The results are given of a number of experiments conducted by the author, which show that an energetic process independent of the assimilation of the carbon dioxid occurs which is exactly represented by the equation $2H_2+O_2=2H_2O$. Further, by the autotropic assimilation of carbon dioxid by the hydrogen-oxidizing bacteria, a decomposition of the carbon dioxid is produced, with the simultaneous liberation of equal volumes of oxygen, the same as in green plants. The

chemism of photosynthesis and that of chemosynthesis are, therefore, considered identical.

Report of the botanist, L. H. PAMMEL (*Proc. Soc. Amer. Florists, 24 (1908), pp. 173–191*).—The author gives a summary of recent investigations relating to plant breeding, some diseases of plants, investigations with seeds, and the toxic effect of certain salts on the growth of plants.

Mutative reversions in cotton, O. F. COOK (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 53, pp. 18*).—Attention is called to the frequent reversions that have been noticed in different varieties of cotton, particularly in the Egyptian races, where the Hindi cotton is regarded as a true reversion. The author claims that the phenomena of reversion are not confined to the changes of single characters, but may result in wide departures from parental types and bring different series of varietal characters into expression. The reappearance of the ancestral characters does not depend upon recent hybridization, but may be shown in abrupt, mutative variations of pure-bred stocks that have been selected for uniformity of a single set of characters. Reversions may be due to new or unfavorable conditions of environment and vary in extent and frequency with changes of external conditions. The uniformity of a given stock in one place affords no assurance that diversity will not appear in another locality.

The Hindi variations of the Egyptian as well as some of the pronounced reversions in Upland cotton are described and discussed at considerable length.

Parthenogenesis in Nicotiana, ROSE H. THOMAS (*Mendel Jour., 1909, No. 1, pp. 5–10*).—In making a study of the fact that *N. sandera*, a supposed hybrid between *N. forgetiana* and *N. affinis*, always comes true to seed, the author investigated a number of species and varieties of Nicotiana, including two forms of *N. tabacum*, and found that they may produce seed parthenogenetically. In her experiments the anthers and stigmas were carefully removed from all the flowers, after which the clusters were bagged. The capsules developed later and contained viable seeds.

It seems from the experiments that parthenogenesis was found in 10 species, varieties, and hybrids, and it is believed by the author that it will possibly be found in all species if the right period of observation is chosen.

Notes on Odontites rubra and the influence of its parasitism on its form, E. HECKEL (*Bul. Soc. Bot. France, 56 (1909), No. 7, pp. 469–473*).—Attention is called to *O. rubra*, a plant closely related to Euphrasia, which is a facultative parasite on the roots of grasses and other plants. When growing as a semiparasite all parts of the plant are vigorous and of a deep reddish color, but when it is not attached to other plants, as occasionally happens (about 5 per cent of the specimens, according to the author), the stems are weaker, there is no trace of the red color, and the plants are a week or more later in flowering.

FIELD CROPS.

Cereals in South Africa, E. R. SAWER (*Cedara Memoirs on South African Agriculture. Pietermaritzburg: Govt., 1909, vol. 1, pp. 343+XVIII, pls. 34, figs. 9*).—The opening chapter deals with meteorology, agricultural geology, chemistry, and soil bacteriology with special reference to conditions in South Africa (see p. 22).

The climatic and other conditions of the region are discussed with reference to corn growing. Descriptions of the types and varieties are followed by the results of 3 seasons' tests of varieties. Imported varieties usually gave low yields during the first year of the test but in the last year Hickory King, Virginia White Dent No. 1, Early Mastodon, and Boone County White, with yields

of 4,662 to 5,990 lbs. of corn per acre stood at the head of a list of 79 varieties averaging 2,442 lbs. of corn and 5,085 lbs. of stalks, etc., to the acre. Among 7 out of 12 varieties, the first Natal generation produced higher yields than did the freshly imported seeds, the averages being 2,119 lbs. and 1,774 lbs. of corn, respectively. Breeding, seed selection and judging, and cultivation are fully discussed with reference to regional needs.

Cultivation alone increased the yield of corn from 360 to 390 lbs. per acre, while subsoiling increased the yield by 116 lbs., and subsoiling and cultivation together by 312 lbs. An application of 170 lbs. sulphate of ammonia, 300 lbs. superphosphate, and 100 lbs. potassium chlorid without cultivation produced an increased yield of 1,330 lbs.; the same fertilizer with cultivation, an increase of 1,160 lbs., and with subsoiling, an increase of 1,448 lbs.; while subsoiling, cultivation and fertilizer combined increased the yield of grain by 1,664 lbs. Corn cut before an early frost yielded 258 lbs. less grain but 410 lbs. more stover than that harvested when ripe about 5 weeks later.

The chief conclusions resulting from numerous other experiments are that vlei lands show a considerable profit from subsoiling, although the hill soils do not so respond. Detasseling, stripping and topping are of doubtful value. Hilling shows slight advantage over drilling, especially by reducing the cost of cultivation. Equal spacing in rows is advocated for all purposes and at all centers.

Long continued experiments with fertilizers showed that on the soils of Cedara and the Weenen Valley a mixture of phosphate and potash sowed in the drills with the seed was the most profitable for corn production. It made little difference whether slag or superphosphate supplied the phosphorus, but if phosphates were omitted the yield was little better than without any manures whatever. The artificial supply of nitrogen on these soils proved unnecessary but was very beneficial on coast soils after the first years' cultivation. Heavy applications of fertilizer produced lower yields than moderate applications. The residual effects of successive applications reduced the effect of later applications by 40 per cent, and after 7 or 8 dressings it became necessary to replace only the actual wastage.

Fertilizers applied in the most favorable way had more than 5 times the effect produced by those applied in the least favorable way and the nearer they came to the seed the better, except in case of saline fertilizers, especially nitrate of soda, which sometimes retarded the germination and early development of the plant when applied in contact with the seed. In some cases residues produced effects twice as great as did the original applications, and the general effect of applications of nitrogen to these soils is illustrated by the fact that the total 4 years' result was less with nitrogen than without in one series of experiments. Applications of 300 lbs. of superphosphate, slag, and bone dust singly gave total yields during 3 years of 2,135, 1,887, and 2,180 lbs. of corn per acre, respectively, leaving as residues in the soil at the end of the period 25, 41, and 50 lbs., respectively, of phosphoric acid. The net profits were £3 4s., £2 14s. 6d., and £3 1d. per acre, while the same fertilizers applied in the first, second, and fourth years of a 4-year test produced net profits of £5 10s. 9d., £5 14s. 6d., and £6 1s. 9d. The greatest average effect of an application of lime alone at a cost of £1 1s. 3d. per acre was only 4s.

Wheat and corn were irrigated with profit, the latter 6 weeks after planting and again at tasseling. Carolina rice failed to mature in the cooler areas, but certain other varieties can be grown under flood irrigation at the various elevations from the Natal high veld to the coast, and Mashona rice produced satisfactory results under dry cultivation. A rotation recommended for irrigated land is corn, winter wheat, tobacco, and field peas.

Six-rowed Cape barley proved more prolific than the two-rowed English varieties but was unsuitable for malting purposes.

Underdrainage increased the grain and straw yields of both barley and oats, and applications of fertilizer produced greater effects on irrigated than on unirrigated lands.

Notes are given on corn rust (*Puccinia sorghi*, syn. *maydis*), wheat rust (*P. graminis*), oat rusts (*P. graminis avenæ*, *P. coronifera*), and others.

Of 49 varieties of wheat only 7 produced harvestable crops from all of six sowings. Of these Bobs, Selina, and Minnesota Blue Stem produced the highest yields. Rieti and Medeah proved the most rust-resistant at the government experimental farm at Salisbury in Rhodesia. In 1904 and 1905, the Texas, Algerian, and Kansas varieties proved the most resistant to rust in a test of 92 samples of 42 different varieties. There was a marked tendency for varieties to deteriorate in rust resistance, the average amount of rust in plants from local seed being 22 per cent more than that in plants of the same varieties from the original seed. Full data from variety, fertilizer, and other experiments on wheat, rice, barley, oats, Kafir corn, millet, buckwheat, and teosinte are given.

A 3-year test of subsoiling for sorghum produced considerable losses especially during the last two years of the experiment. Advice and information are given on the cultivation and marketing of farm products, including a discussion of farm machinery and methods of handling grain in the United States. Paper making from cornstalks, and the malting qualities of South African grains are also discussed.

[Experiments with field crops at Poona], T. F. Main, G. S. Henderson, J. B. Knight, and W. Burns (*Ann. Rpt. Dept. Agr. Bombay, 1908–9, pp. 17–42*).—Results of variety tests with American, Cambodia, indigenous, hybrid, and tree cottons are given. Wheat selection was conducted with special reference to the number of spikelets per head, tillering capacity and rust resistance, and new wheats of India and foreign origin were tested.

The Gudghi sorghum produced more than twice as much grain and kadbi per acre as any other variety and at slightly lower cost, resulting in a net profit 3½ times as great as that of any other variety. It ripened a month earlier than other varieties, indicating adaptability to regions where rainfall is short.

Analyses by the agricultural chemist indicate the oil and moisture content of numerous varieties of sesame and castors.

Open and shade grown Florida tobacco produced 1,200 and 680 lbs. of cured leaf per acre respectively, while yields of Sumatra tobacco were 1,120 and 840 lbs. The shade-grown leaf became brittle and difficult to handle because of difficulty in regulating humidity and temperatures.

The Duke of Cornwall and Northern Star potatoes produced yields of 33,142 and 32,800 lbs. per acre, respectively. Notes are given on tapioca and canaigre (*Rumex hymenosepalus*) and other crops, and of tillage, cultural, manurial, rotation, irrigation, and miscellaneous experiments. Deeply plowed land produced 439 lbs. of wheat per acre, or 165 lbs. more than land plowed with the native plow, while that planted in drills 18 in. apart produced 81 lbs. more grain than did twice the seed in drills 9 in. apart.

Brief sketch of the experiments of the Poltava experiment field for the year 1908, S. T. Tretyakov and K. L. Verbetski (*Kratkiĭ Ocherk Opuit. Poltavsk. Opuitn. Polya, 1908, pp. 13–68, figs. 11*).—An account is given of experiments with winter rye, wheat, and other crops.

Meteorological conditions are reported in full for various periods of plant growth, especially the flowering period and the period from the beginning of growth in spring to earing. The winter cereals of 1908 were well provided

with soil moisture and nitrogen accumulated by the time of sowing and started rapidly, but later the dry fall, unfavorable winter, and cool spring restricted vegetative growth and caused a low amount of dry matter. Favorable conditions at the time of flowering and ripening led to a rather larger yield than that of 1907, as shown by the following table:

Yields of winter wheat and rye in 1907 and 1908.

	Winter rye.		Winter wheat.	
	1907.	1908.	1907.	1908.
Mean number of stems on 1 sq. arshin (28 by 28 in.)...	178	225	237	299
Yield of grain in poods (36.11 lbs.) per dessyatina (2.7 acre)...	170	182	165	167
Weight of 1,000 grains in grams........	23.72	24.92	26.72	28.92

Summer cereals were sown April 17 with about 23 per cent of moisture in the upper 25 cm. of soil. The rainfall of the preceding month was 21.4 mm. or one-half that of the corresponding period of the year before. Because of cold weather, sprouting required 8 to 9 days, or 4 days longer than in 1907. In 1907 the weight per 1,000 grains of wheat was 27.07 gm., of oats 26.39 gm., and of barley 37.57 gm., while in 1908 these weights were 35.05 gm., 29.75 gm., and 37.57 gm., respectively. The yield of wheat in 1908 exceeded that for 1907 by 25.2 poods per dessyatina, and of oats and barley by 4 poods per dessyatina. As in previous years, 6 poods per dessyatina proved the best rate of seeding.

Occupied fallows surpassed green fallows, if occupied by early crops and plowed twice on harvesting these crops. Corn fallow yielded lower crops than black fallow, but gave greater benefit to the winter cereal in a 3-year rotation. An application of 2,400 poods of manure per acre gave a yield 1.6 times as great as an application of one-half that amount, and a straw yield 2.72 times as great.

Other experiments conducted with summer crops related to methods of sowing, depth and time of plowing, and variety tests.

[Yields of small grains, alfalfa, and timothy in Nevada], G. H. TRUE (*Nevada Sta. Bul. 66, pp. 21–24*).—The highest yield of wheat reported is 75.58 bu. per acre-foot of water, secured from February seeding with one irrigation. Seventy-eight bu. of Siberian oats and 90.6 bu. of barley per acre-foot of water were likewise secured with one irrigation. At the Dangberg ranch, 92.63 acres of barley, irrigated 3 times, produced an average yield of 84.5 bu. per acre, or 31.5 bu. per acre-foot of water, while the first cutting of 3.87 tons of alfalfa and timothy was followed by a second crop of 2.46 tons of alfalfa per acre, and 50 acres of alfalfa alone produced 5.8 tons per acre at 2 cuttings. Among the wheat varieties at the station, receiving no irrigation after plowing, Crimean, S. P. I. No. 1559, and Turkey, S. P. I. No. 1571, produced the highest yields, 36.6 and 30 bu. per acre, respectively.

On the seeding and maintenance of grass land, H. J. DANNFELT (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 6, pp. 465–534*).—Digests of recent investigations and practical experience as to the value of different species of grass and legumes for permanent pastures are given, and the best methods of preparing the land, the kinds and quantities of seed mixtures to be used, methods of irrigation, fertilization, and reseeding discussed in detail. Examples of successful pasture management on various Swedish soils are cited.

[Handbook for dry farmers] (*Dry Farming Cong. Bul., 3 (1910), No. 3, pp. 295*).—This number contains a complete stenographic report of the fourth dry farming congress, October 26, 27, and 28, 1909.

Cooperative experiments of the department of agronomy, M. F. MILLER and C. B. HUTCHISON (*Missouri Sta. Circ. 36, pp. 11*).—This circular is designed to furnish directions to the farmers cooperating with the state station in the experiments with alfalfa, corn, oats, wheat, barley, grasses, clovers, and potatoes.

Distribution of seeds and plants, E. J. WICKSON and R. E. MANSELL (*California Sta. Seed Bul. 1909–10, pp. 6*).—This reports the number of packages of seed distributed since 1902, outlines the aims and methods of the distribution, and lists the seeds now available for that purpose.

Development and standing of German agricultural plant breeding, P. HILLMANN (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 1, pp. 1–9*).—These pages contain a review of the principal work of German plant breeders for the past year and an estimate of the influence of the German agricultural society.

The velvet bean, J. M. SCOTT (*Florida Sta. Bul. 102, pp. 45–56, 57, 58, figs. 3*).—Continuing previous work on this subject (E. S. R., 13, pp. 1042, 1075), a brief historical sketch of the velvet bean is followed by directions as to the time and method of planting, seed selection, cultivation, and harvesting, a discussion of its use as seed and as a soil renovator, and a report of experimental work with the crop.

When planted from 10 to 15 in. in the drill in rows 4 ft. apart, 1 bu. of seed planted 4 acres and 2,258 lbs. of beans in the pod or 22.5 bu. of shelled beans were harvested per acre, while when planted in rows 8 ft. apart, alternating with corn rows, the yield was 20.3 bu. of shelled beans per acre in addition to the yield of corn.

Plats fertilized with dried blood, acid phosphate, and muriate of potash, separately or in various mixtures, usually failed to produce as high yield as the unfertilized plats. The few increased yields were obtained at an economic loss.

Paris green at the rate of from 1 to 3 lbs. per acre has been found effective as a means of preventing injury from the caterpillar of *Anticarsia gemmatilis*,

Crimson clover, J. F. DUGGAR (*Alabama Col. Sta. Bul. 147, pp. 105–129, figs. 3*).—The cultural requirements of crimson clover in Alabama and its value as a nitrogen gatherer are discussed and directions given for securing a stand. On reddish, sandy upland loam soil, of the Cecil series, the inoculated crop produced 6,100 lbs. of hay per acre, while the uninoculated produced no harvestable crop. On Norfolk sandy loam, the yield was estimated at 1 ton of hay per acre after inoculation, while the plants on the uninoculated plats had no tubercles, were yellowish, and either died without blooming or bloomed at a height of 2 to 6 in. Results of earlier tests with pure cultures (E. S. R., 9, p. 743; 10, p. 837) are reprinted.

Broom corn, W. R. PERKINS (*Mississippi Sta. Bul. 134, pp. 5*).—The characteristics, varieties, and cultural requirements of broom corn are discussed and directions given for seed selection, planting, cultivation, harvesting, stripping, curing, baling, and storing.

American export corn (maize) in Europe, J. D. SHANAHAN, C. E. LEIGHTY, and E. G. BOERNER (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 55, pp. 42, figs. 7*).—This circular reports the observations made during 1906, 1907, and 1908 on wheat arriving at European markets from the principal American ports.

Data were gathered with regard to 15,077,987 bu. of corn, of which 12.7 per cent was heating or hot on arrival. In 8 cases the entire parcel or cargo was hot or heating. All of this corn was certificated as No. 2 corn, No. 2 corn sail grade, or prime (sail) mixed corn. The quality and condition requirements of these grades are similar. Tabulated data and charts are given as to the condition of the various cargoes.

During the period from November, 1906, to May, 1907, inclusive, 88 cargoes aggregating 6,598,351 bu. arrived with 17 per cent of the entire quantity in a heating or hot condition. The cargoes were loaded on dates between October 17, 1906 and May 9, 1907. Some hot corn was found in each of 43 cargoes, and 5 were made up entirely of hot or heating corn. The cool corn varied from 12 to 20.6 per cent in moisture content, averaging 17.1 per cent, and with 50.2 per cent of it in excess of 18 per cent. The dirt and foreign material varied from 0.2 to 4.5 per cent, except for one sample which contained 62.5 per cent, but represented corn located under a hatch.

Of corn loaded between December 17, 1907, and May 1, 1908, 24 cargoes arrived cool, 28 cargoes in part heating or hot, and 1 cargo heating or hot throughout. The cool corn varied from 14 to 20 per cent in moisture content, and the dirt and foreign material present from 0.3 to 12.3 per cent. Of the heating or hot corn, 67 per cent was located next to the engine, boiler rooms, or over the propeller-shaft tunnels.

For the three seasons studied, the highest percentage of heating or hot corn, 42.3 per cent, was found in shipments made during May and the next highest during April, while the percentage during March was less than during January or February. Corn loaded during October and November was apparently old crop corn and in no instance was found out of condition or heating.

According to the rules adopted by the Grain Dealers' National Association, in October, 1908, 18.7 per cent of this corn shipped as No. 2, or equivalent grades, would have been graded as No. 2 or better, 50.1 per cent as No. 3; 18.6 per cent as No. 4, and 12.7 per cent as "sample" on account of being heating or hot.

The percentage found heating or hot varied directly as the length of time in the ship and the moisture content. So-called dried corn which arrived cool contained from 15.2 to 19.4 per cent of moisture. The partial drying of corn containing high percentages of moisture was found to so disturb conditions as to make such corn unsafe for ocean shipment. Steamer and No. 3 corn arrived with a moisture content of 19.2 to 22.5 per cent and when stored in holds free and away from artificial heat no heating or hot corn was found. The moisture content of rejected and dried corn ranged from 13.2 to 17.4 per cent.

Complaints were noted of wheat received in a badly heating or damaged condition, due to high moisture content, and of the delivery of wheat not of the grade purchased because of the presence of dirt, soft wheat, damp, smutty or heat-damaged wheat, or wild garlic.

Changes in moisture content on board ship may arise from the transfer of moisture by air currents or by chemical changes within the kernel. The conditions necessary for shipping damp corn are a short voyage and low air temperature at the time of loading and during the voyage and the absence of heat from the ship's boilers. Argentine corn arrived with a moisture content of from 12.2 to 15.5 per cent.

Accumulations of dirt, foreign matter, and finely broken particles of corn beneath the hatches were frequently observed, together with heating and moldy corn. The influence of length of voyage, arrangement of bulkheads and different forms of grain contracts on deliveries of American grain are discussed, and studies given of the demands of the London market and prices paid for corn from various countries. During the period from 1902 to 1908, inclusive, the average price for American corn was 1.42 cts. per bushel below that for all corn received. Definite recommendations are given looking toward the improvement of the standing of American corn in foreign markets and a table presented showing the relative worth of grain on a dry matter basis, when prices range from 40 cts. to $1 per unit and the moisture content from 12 to 25 per cent.

Investigation of the vitality of Kansas seed corn, A. M. Ten Eyck (*Kansas Sta. Circ. 8, pp. 4*).—This circular reports the results of germination tests of samples of corn submitted by farmers of 57 counties. The results are shown in the following table:

Results of germination tests with Kansas seed corn.

No. of samples.	Description.	Germination percentage.	No. of samples.	Description.	Germination percentage.
9	Cribbed early	93.30	16	Early varieties	89.03
80	Gathered early, well saved	97.70	66	Medium early maturing	95.11
36	Gathered late	87.70	32	Medium maturing	95.60
6	From shock, late	86.60	32	Late maturing	92.79
15	Reid Yellow Dent	98.80	17	Southeastern Kansas	95.75
28	Kansas Sunflower	95.94	54	Southern Kansas	93.21
49	Boone County White	94.52	50	Northern Kansas	88.78
23	Hildreth	92.38	112	Northeastern Kansas	92.50
11	Silver Mine	86.85	250	Average of all tests	92.25
123	Other varieties	91.47			

The average germination percentage of early gathered corn was nearly 7 per cent better than that of late gathered corn, but there was little difference in vitality between late gathered seed and that from the shock.

Corn judging: Studies of prominent ear characters in their relation to yield, C. G. Williams and F. A. Welton (*Ohio Sta. Bul. 212, pp. 213–236, figs. 9*).—In a 5 years' comparison of long and short ears of corn as seed the former produced the higher yield by 3.97 bu. per acre. In 1909, the average difference in a test covering 5 varieties was 5.18 bu. No difference was detected between the yield from long ears and those of medium length, the lessened yield resulting from the use of short ears.

Cylindrical ears produced an average yield of 1.08 bu. greater that that produced by tapering ears, in a test of 4 varieties, in 1909, while a 4 years' test showed an average advantage for the tapering ears of 0.87 bu.

Plats planted with seed from bare tipped ears yielded 0.42 bu. per acre more than those planted with seed from well tipped ears. Seed selected from this harvest showed in the second year a difference of 1.45 bu. in favor of the well filled tips, and in the third year the difference was increased to 2.19 bu. The seed ears with filled tips were shorter and heavier, had a slightly greater circumference and shelling percentage, and produced a crop having 16.4 per cent more ears with filled tips.

Plat yields showed a difference of 0.99 bu. in favor of rough dented ears in 1908, but of 2.17 bu. in favor of smooth dented ears in 1909. The smooth dented ears averaged 1.2 oz. less in weight, 0.2 in. less in length, 0.5 in. less in circumference, and 3.5 less in shelling percentage, but in the 5 years' ear row tests had an average advantage in yield of 2.84 bu. per acre.

Results with heavy and light seed ears confirm those previously noted, (E. S. R., 19, p. 332). Of 400 ears tested, the heaviest 40 per cent exceeded in average weight the lightest 40 per cent by 2.46 oz. per ear, and in an ear row trial, produced a yield greater by 2.08 bu. per acre. In plat tests, the average results for 2 years showed a difference of 1.93 bu. per acre in favor of the heavy ears. Of the same 400 seed ears, the 40 per cent having the highest shelling percentage produced average yields per acre 1.2 bu. lower than the 40 per cent having the lowest shelling percentage. The shelling percentage of the harvest was 4.1 per cent in favor of that from the ears having the higher shelling percentage. Among 200 ears, the 20 having the lowest shelling percentage excelled

the 20 having the highest by 6.42 in shelling percentage and 3.57 bu. per acre in yield.

Seed corn taken from a highly manured plat and known as the rich strain outyielded in 1907 a plat unfertilized for 16 years and known as the poverty strain by 0.98 bu. per acre, and in 1908, by 2.32 bu., but in 1909 the poverty strain led by 3.8 bu. Ears selected from stalks grown in normal stand produced, in a 4 years' test, an average of 2.36 bu. more per acre than ears selected without knowledge of the stand. Seed selected from plats planted at the rate of 1, 3, and 5 plants per hill produced yields of 91.49, 91.74, and 92.58 bu. per acre, respectively.

From 600 ears germinated under 1 in. of soil, those first up produced an average yield 2.84 bu. less than those which came up last. The kernels containing the larger proportion of white starch absorbed water more rapidly and germinated more quickly. The 40 per cent of ears showing the best germination produced an average yield 0.68 bu. per acre greater than the 40 per cent showing the poorest germination.

In hills 42 in. apart each way, the plats planted at the rate of 4 plants per hill produced a greater yield than those planted at the rates of 1, 2, 3, or 5 plants per hill.

Crossing experiments with corn, P. HOLDEFLEISS (*Ber. Physiol. Lab. u. Vers. Anst. Landw. Inst. Halle, 1909, No. 19, pp. 178–199*).—The author used numerous different types of corn in his experiments and presents observations on xenia and mutations. It was observed that short shanked ears were less inclined to the simultaneous production of male and female flowers than were the long shanked ears, while this mingling of male and female flowers occurred most frequently on the suckers.

Corn: Variety tests, seed breeding, selection and testing, C. W. NASH (*Maryland Sta. Bul. 141, pp. 103–134, figs. 10*).—During the period 1903–1907 the highest yielding varieties were Cocke Prolific, Selection No. 77, and Boone County White (Indiana) with yields of 63.6, 58.9, and 57.62 bu. per acre, respectively. During the periods 1904–1907 and 1905–1907, and during the single years 1907 and 1908, the St. Omer variety stood first with yields ranging from 63.53 to 86.16 bu. per acre. The results of variety tests at 6 different farms are reported in tabular form, as are also data regarding 28 varieties tested at the station in 1907–8. Chemical analyses show the protein, fat, and ash content of the seed used and of the crop produced in the case of 19 of these varieties. The score cards adopted by the Ohio Corn Improvement Association for use in the plant selection of corn, in the judging of corn at husking time, and in the final selection of seed ears are presented with explanatory notes. Full directions are given for conducting germination tests.

[Variety and distance tests of corn and cotton], J. L. BURGESS (*Bul. N. C. Dept. Agr., 31 (1910), No. 2, pp. 19*).—A test of 37 varieties at the Edgecombe farm indicates that northern and western varieties do not yield as well on this farm as varieties previously grown in a lower latitude. Biggs Seven Ear, Patton and Marlboro Prolific produced the highest yields.

At the Iredell farm, 37 varieties of corn were tested on Cecil loam. The best yields were produced by Parker Cocke Prolific, Wilson Success, and Boone County Special. The Prolific corns made the largest yields at this and the Edgecombe farm. Among 21 varieties of cotton, King Improved and Missionary produced yields worth $4.50 per acre more than those produced by any other variety. The highest yield of corn was produced in rows 5 ft. apart with plants 1½ ft. apart in the row, while plants 20 to 24 in. apart in rows 3½ ft. apart produced the highest yields of cotton.

At the Buncombe farm, corn yields ranged from 13.1 to 28 bu. per acre. Boone County White and Thompson Prolific produced the best yields on upland soil. The Patton variety produced the poorest yield on this soil and the best yield on the bottom soil.

Tests of varieties of cotton in 1909, J. F. DUGGAR and E. F. CAUTHEN (*Alabama Col. Sta. Bul. 149, pp. 3–8*).—Crimson clover sowed on inoculated land September 9 between corn rows produced a crop 10 to 18 in. high by the following April, which when plowed under enabled the thin gray, sandy land to produce unusually large yields of cotton. In a variety test of 30 varieties, Cook No. 206, Cook No. 221, Dixie, and Hardin produced the most profitable yields as corrected to uniform stand. Prevalence of anthracnose on the station farm afforded opportunity to test the relative susceptibility of varieties to this disease. The Rowden, Cleveland, Dixie, and Simpkins varieties showed only 5 per cent each of diseased bolls.

Cotton, 1909, W. R. PERKINS (*Mississippi Sta. Bul. 135, pp. 16*).—Meteorological data for 1909 are presented, together with variety, fertilizer, and cultural tests, and notes on cotton breeding and preparation of the soil.

In a test of 23 varieties the maximum yield, 2,310 lbs. of seed cotton per acre, was produced by Cook Improved, which was also one of the most diseased varieties, while the least diseased were Sugar Loaf and Gold Coin, which stood sixth and fourteenth respectively in yield per acre. Plantings of cotton in rows, 4, 5, and 6 ft. apart produced yields of 2,175, 2,049, and 1,930 lbs. of seed cotton per acre respectively. Topped cotton excelled in yield that which was not topped and had an advantage in early maturity. In a 3 years' fertilizer test, the maximum average yield of 2,176 lbs. of seed cotton per acre was produced on the plat fertilized at the rate of 2,000 lbs. of manure per acre, while that fertilized at the rate of ½ ton of manure and 100 lbs. of lime per acre produced 1,890.4 lbs. Each of the 11 formulas was tested in duplicate to ascertain the effect of a light application of nitrate of soda at time of planting, but no benefit appeared from the application.

The average period required for the maturity of bolls from blossoms that were white on July 15 was 46 days, from those white on August 2, 45 days, and from those white on July 24, 44¾ days. The tendency appeared to be for the smaller bolled varieties to open in a shorter period than that required by the big-bolled varieties. No marked difference in earliness of maturity appeared to follow plowing at different depths or different applications of fertilizer.

American cotton system, T. S. MILLER, Sr. (*Austin, Texas, pp. VII+294, pls. 3*).—A chapter on the history and botany of cotton is followed by discussions of the classification and marketing of the fiber, the origin and operation of cotton exchanges, and the arithmetic of cotton.

Effect of future contracts on prices of cotton.—Influence of producers' organizations on prices of cotton (*U. S. Dept. Com. and Labor, Rpt. Comr. Corporations on Cotton Exchanges, 1909, pts. 4 and 5, pp. XXII+370, charts 24*).—Future prices, abnormal discounts, hedging, fixed differences, spot prices, short selling, and producers' organizations and their effects upon prices of cotton are fully treated by statistical and graphic methods. The Farmers' Union, the Southern Cotton Association, and the National Cotton Association, and their purposes, forms of organization, membership, and methods of operation are treated, as well as their efforts to reduce acreage and to maintain the price of cotton by action with respect to minimum prices and warehouse policies.

Technical examinations of different flax fibers from Swedish Moor Culture Association, G. SELLERGREN (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 4, pp. 328–336*).—In technical examinations of different flax fibers

from the Swedish Moor Culture Association, the strength and elasticity of fibers were tested by means of a dynamometer constructed by the author. It appeared that sulphate of ammonia used as fertilizer decreased the strength of the fiber, while farmyard manure increased it. Loam, sandy and peat soils produced equally good flax in approximately equal quantities.

Peanuts, E. B. FERRIS (*Mississippi Sta. Bul. 130, pp. 3–10*).—This bulletin, based on work at the McNeill substation and other Southern stations, is designed to furnish information to meet the requirements of the farmers of the State. The more important varieties and their fertility and cultural requirements, yields, and uses as food, stock feed, and for soil improvement are discussed.

Sugar cane for sirup making, E. B. FERRIS (*Mississippi Sta. Bul. 129, pp. 3–16, figs. 4*).—This popular treatise states briefly the history, soil and fertility requirements of sugar cane and the more important points in growing, cultivating and harvesting the crop and making the sirup.

The following table gives some results of 2 years' work with fertilizers under plant and stubble cane:

Results with fertilizers for sugar cane.

Fertilizers per acre			Yields.		
Cotton-seed meal.	Acid phosphate.	Kainit	Plant cane.	Stubble cane.	Total.
Pounds.	*Pounds.*	*Pounds.*	*Tons.*	*Tons.*	*Tons*
210	208	90	28 6	16 7	45 3
210	454	90	34 7	20 8	55 5
420	416	180	34 42	21.0	a 55 42
420	416	180	35.2	20.4	55 6
838	832	358	39 2	22 6	61 8
			30 6	16.8	47.4
420	162	61	32.4	18.0	50.4

a One-half applied in spring and one-half in July

Two Finnish root crops, G. GROTENFELT (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 4, pp. 289–297*).—This article gives the history and characteristics of 2 varieties of turnips.

The price of wheat in France, N. BEAUBIEUX (*Les Prix du Blé en France, Paris, 1909, pp. 108, fig. 1*).—A statistical history of the price of wheat is followed by studies of production, transportation, customs legislation, and currency as influencing the price of wheat. A bibliography of the subject is given.

The quality of German grain grown in 1909, J. BUCHWALD and R. PLOETZ (*Ztschr. Gesam. Getreidew., 2 (1910), No. 2, p. 42*).—Data relating to the moisture content, weight, and purity of seed of rye, wheat, and oats from different German provinces are summarized.

The spread of the important weeds in Russia, A. MALZEW (*Trudui Byuro Prikl. Bot., 2 (1909), Nos. 5–6, pp. 251–312, dgms. 108; 11, pp. 595–664, dgms. 56*).—The distribution of 162 weeds is graphically indicated and their spread by accidental and human agencies briefly discussed. Many references are given to authorities quoted.

HORTICULTURE.

Forcing plants by warm baths, II, H. MOLISCH (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 118 (1909), No. 6, pp. 637–693, pls. 2*).—In continuation of his studies of the warm-water bath method of forcing flowering shrubs and plants (E. S. R., 20, p. 640), the author conducted a number of ex-

periments in 1908–9 with the view to determining, among other things, the possibility of substituting heated humid air for the warm water, the influence of warm baths when applied previous to the autumnal leaf fall, the leaf stripping of shrubs in its relation to forcing the buds, the specific influence of the warm bath on various horticulturally important plants, bulbs, tubers, and seed, and the effect of cold and temperature changes on the forcing of buds. The experiments, together with the results, are discussed in detail.

In general only the Forsythia and the common lilac responded to the warm-water treatment previous to the autumnal leaf fall. Likewise a bath of humid air of the same temperature as the warm water and maintained for the same length of time was found to be generally unsatisfactory as a substitute for the warm-water bath. Favorable action was secured with the lilac, however, when it was submitted to a long continued air bath in December, and later on, when the dormant condition was less complete, many other shrubs were stimulated by the warm air bath. The following commercially important plants were readily forced by means of the warm-water bath: *Syringa vulgaris*, *S. persica*, *Forsythia suspensa*, *Prunus triloba*, *Spiræa palmata*, *S. japonica*, *Azalea mollis*, *A. pontica*, *Salix caprea*, and *Convallaria majalis*. The warm-water bath also acted favorably in stimulating the growth of certain bulbs such as onions and narcissus and tubers of Sauromatum and Amorphophallus, as well as in hastening the germination of mistletoe seed which had undergone a portion of the resting period.

The exposure of dormant buds to frequent variations in temperature acted quite unfavorably on their forcing capacity.

Lilacs which were stripped in spring and early summer leafed out again abundantly, whereas with those stripped after the middle of July the buds remained dormant, except when treated to the warm bath.

The author reviews various theories as to the factors responsible for the stimulating effect of the warm bath. The failure of the warm air bath when used as a substitute for the warm water indicates that something other than the high temperature is responsible for the beneficial action, although just what causes this the author is not as yet prepared to say.

The culture of plants in pots, A. Petit (*Principes Généraux de la Culture des Plantes en Pots. Paris, 1910, pp. 169*).—The present work is offered as a record of the author's experience and observations on the pot culture of plants rather than as a complete treatise on the subject. The following are among the important phases discussed: The influence of the pots on the development of plants, size and porosity of the receptacles in relation to the growth of the plants, danger of repeated potting, selection of soils, watering, and fertilizers.

Manual of gardening, L. H. Bailey (*New York, 1910, pp. XVI+539, pls. 25, figs. 256*).—This manual is offered as a practical guide to the making of home grounds and the growing of flowers, fruits, and vegetables for home use. The subject-matter is a combination and revision of many parts of Garden Making (E. S. R., 10, p. 50) and Amateur's Practical Garden Book (E. S. R., 12, p. 753), together with considerable new material and the results of 10 years' added experience.

The vegetable grower's guide, J. Wright and H. J. Wright (*London, [1908?], vols. 1, pp. X+352, pls. 15, figs. 131; 2, pp. 350, pls. 15, figs. 62*).—The purpose of this comprehensive treatise is to present the principles of vegetable growing for the benefit of both private and market gardeners.

General consideration is given to the location of the garden, drainage, planning, paths and edgings, buildings and appliances, preparation of the land, manures and manuring, rotations and inter-cropping, and enemies in the kitchen

garden. Specific cultural treatment for all of the ordinary vegetables is presented, with special reference to English conditions.

Snap beans, E. B. FERRIS (*Mississippi Sta. Bul. 131, pp. 3–8*).—This is a short treatise on the culture of snap beans, on the basis of the results of cultural tests conducted at the McNeil substation. It discusses soils and their preparation, the time to plant, varieties, fertilizers, cultivation, gathering, packages, shipping, and diseases. Results of fertilizer trials in 1906 and 1908 are reported.

How to grow muskmelons, J. W. LLOYD (*Illinois Sta. Circ. 139, pp. 19, figs. 7*).—A popular circular containing directions for growing muskmelons on a commercial scale. It discusses soil and location, soil preparation, seed sowing and transplanting operations, cultivation, insect enemies, diseases and other obstacles, varieties, and seed.

Fruit growing for home use in the central and southern Great Plains, H. P. GOULD (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 51, pp. 23, figs. 5*).—This circular is the outcome of a study of conditions, varieties, methods, etc., in the central and southern Great Plains, and consists largely of an account of the methods that appear to be best suited to the climatic and other conditions in that region and which thus far have given promising results. Consideration is given to the location of the region under discussion, the present status of fruit growing, the outlook for the future, climatic conditions, sites for fruit plantations, preparing the land, nursery stock, planting operations, wind-breaks, orchard maintenance, and varieties of orchard and small fruits.

Gooseberries for the home garden or commercial orchard, W. S. THORNBER (*Washington Sta. Popular Bul. 25, pp. 4*).—Popular directions are given for growing gooseberries, including a discussion of soil, propagation, planting, cultivation, pruning, harvesting and marketing, and notes on European and American varieties. As tested at the station, the 3 best English varieties are Industry, Portage, and Whitesmith, and the 3 best American are Downing, Josselyn, and Houghton.

Currants for the home garden or commercial plantation, W. S. THORNBER (*Washington Sta. Popular Bul. 26, pp. 4*).—A bulletin similar to the above on the culture of currants.

As a result of 3 years' test at the station it is stated that the size, color, productiveness, and attractiveness of the Red Cross currant make it an especially valuable new sort. Wilder, on account of its mild flavor, productiveness, and vigor, is considered one of the best varieties. Of the older varieties, Victoria, Pomona, and Cherry appear to be very valuable for home as well as commercial purposes.

On the herbaceous grafting of grapes, G. VERGE (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 17, pp. 509–513, figs. 2*).—Results are given of some experiments conducted by the agricultural school at Montpellier, from which it appears that the lack of success of the various systems of herbaceous grafting as employed in France is largely due to the failure to remove the leaves and thus check excessive transpiration.

Orchard fertilization, J. P. STEWART (*Proc. State Hort. Assoc. Penn., 50 (1909), pp. 22–38, fig. 1*).—The data presented have been previously noted (E. S. R., 21, p. 237).

The Canadian apple grower's guide, L. WOOLVERTON (*Toronto, 1910, pp. [illegible], pls. 3, figs. 146*).—Part 1 of this work forms a complete guide to the planting, culture, harvesting, and marketing of apples. In part 2, the apples of Canada are described in detail and illustrated from specimens of varieties grown in the Dominion. Part 3 contains lists of varieties recommended for planting in the various apple districts of the Dominion.

Culture of pineapples and bananas, C. F. AUSTIN (*Estac. Cent. Agron. Cuba Circ. 32, pp. 18*).—This circular contains popular information relative to the culture and marketing of pineapples and bananas.

Coconut culture in Brazil, L. GRANATO (*Bol. Agr. [São Paulo], 11. ser., 1910, No. 1, pp. 16–39, figs. 9*).—This is a report to the Brazilian secretary of agriculture relative to the coconut industry in Brazil, including information on its distribution, varieties cultivated, cultural details, harvesting, yields, insect and other enemies, cost of culture, commerce, and coconut products.

The care of trees in lawn, street and park with a list of trees and shrubs for decorative use, B. E. FERNOW (*New York, 1910, pp. X+392, pls. 2, figs. 115*).—This is a manual on the care of trees in lawns, streets, and parks. The subject matter consists of a compilation of well-known facts gleaned from the scattered literature on this subject. The successive chapters discuss the characteristics, structure and life of trees, disease and death of trees, diagnosis of diseases, control of physiological diseases and treatment of mechanical injuries, general care of trees, control of parasites, care in planting trees, esthetic forestry or woodland park management, and care in choice of plant material.

A brief list of books on related subjects is appended.

The small home yard, A. P. WYMAN (*Illinois Sta. Circ. 138, pp. 3–16, figs. 8*).—A popular circular containing suggestions for planning and planting the small home yard. It discusses the making of lawns and walks, the location of trees, shrubs, and vines, and the varieties of each suitable for producing pleasing effects.

How to fix up the yard, H. F. MAJOR (*Illinois Sta. Circ. 135, pp. 24, figs. 24*).—This circular contains popular suggestions relative to the grouping of ornamental plants for the yard, together with notes on a number of trees, shrubs and vines and where to plant them.

FORESTRY.

[Report of the forest section] (*Nat. Conserv. Com. Rpt., 1909, vol. 2, pp. 179–758, pls. 37, figs. 10, maps 4*).—The following papers, prepared by the experts with whose names they appear, constitute the body of the information on which the report of the forest section of the United States National Conservation Commission was based and from which the statements of the secretaries were in the main formulated.

Rate of forest growth, E. A. Ziegler (pp. 203–269).—This paper contains data on the approximate rates of growth of different forests, time required to produce various wood crops, acre yields, present average production per acre, and total production.

Foreign sources of timber supply, R. Zon (pp. 280–370).—In part 1, the author considers the nature and extent of the forest resources of the principal wood producing countries, and in part 2 he reviews the timber trade of the various countries of the world with the purpose of showing how far we can count on foreign sources of supply. This review shows a steady increase in wood consumption and imports of nearly all the leading import countries, and but 3 important countries, Russia, Finland, and Sweden, which can increase their export without lessening their forest capital. The literature consulted in preparing this paper is appended.

Forest fires, C. Leavitt (pp. 390–468).—This paper discusses the damage from forest fires, their causes, prevention and control, and the results in control work accomplished by the federal government, state governments and by private owners.

Taxation of timber lands, F. R. Fairchild (pp. 581–632).—This paper consists of a study of timber land taxation. The first chapter deals with the general

principles of taxation, and succeeding chapters discuss forest taxation laws in the United States, forest taxation in the United States in practice, the effects of taxation on the forests of the United States, the real economic problem of taxation, principles of scientific forest taxation, and practical considerations and problems of administration.

Wood preservation, W. F. Sherfesee and H. F. Weiss (pp. 658–667).—The authors trace the progress of wood preservation in the United States and discuss the relations of wood preservation to forest conservation.

Forest planting, A. S. Peck (pp. 668–686).—A discussion of the opportunities for and need of forest plantings.

The remaining papers in the volume are as follows: Original Forests, by R. S. Kellogg (pp. 179, 180); Standing Timber in Wood Lots, by W. Bradfield (pp. 181–187); Stand of Timber, by H. K. Smith (pp. 188–190); Standing Timber Owned by the States, by J. G. Peters (p. 191); Standing Timber in Possession of the Federal Government, by J. M. Homans (pp. 192–195); Forest Products, by R. S. Kellogg (pp. 196–202), noted from another source (E. S. R., 21, p. 444); Methods of Increasing Forest Productivity, by E. E. Carter (pp. 270–279), noted from another source (E. S. R., 22, p. 450); Cost of Forestry in Different Countries, by H. S. Graves (pp. 371–374); Extent to which Foreign Methods of Forest Administration are Suited to Conditions in the United States, by S. T. Dana (pp. 375–389); Waste and Reduction of Timber Supplies Caused by Insects and Methods of Prevention and Control, by A. D. Hopkins (pp. 469–497); Conservative Turpentining, by G. B. Sudworth (pp. 498–511); Conservative Logging, by E. N. Clapp (pp. 512–546); Waste in Milling, by L. Margolin (pp. 545–567); Waste in Use of Timber, by M. Cline (pp. 568–580); Reduction of Timber Supply Through Abandonment or Clearing of Forest Lands, by W. B. Greeley (pp. 633–644); Utilization of Wood Waste by Chemical and Other Means, by H. S. Bristol and L. F. Hawley (pp. 645–657); Water Circulation and Its Control, by B. Willis (pp. 687–710); Methods which should be Adopted by Private Owners to Insure the Perpetuation of our Timber Supply, by C. S. Chapman (pp. 711–724); What the States should do to Perpetuate the Forests, by F. Roth (pp. 725–747); and Past and Present Prices of Forest Products, by H. S. Sackett (pp. 748–758).

Forest conditions in Ohio, C. E. THORNE, W. J. GREEN and E. SECREST (*Ohio Sta. Bul. 211, pp. 171–212, figs. 17*).—In addition to brief reports by the director and by the state forester relative to progress in forestry work during 1909, an account is given of the reconnaissance forest survey work conducted during the past season and which as in previous surveys (E. S. R., 21, p. 739) consisted of an examination of existing conditions in the native forest stands, as well as in various plantations established by landowners in cooperation with the station. The territory here reported on includes the counties of Wayne, Greene, and Washington. In addition to the discussion of existing conditions, plans are suggested for the improvement of wood lots.

Reforestation of the marginal lands of the Wachusett reservoir of the metropolitan water works, Boston, Mass., E. R. B. ALLARDICE (*Jour. Assoc. Engin. Soc., 44 (1910), No. 1, pp. 71–93, figs. 5; abs. in Engin. News, 63 (1910), No. 15, pp. 417–420, figs. 5*).—This paper consists of a detailed account of the work undertaken by the Metropolitan Water and Sewerage Board in reforesting marginal lands of the Wachusett reservoir. Considerable data on this work has been previously noted (E. S. R., 20, p. 1040).

The Riding Mountain forest reserve, J. R. DICKSON (*Dept. Int. Canada, Forestry Branch Bul. 6, pp. 42, pls. 15*).—The purpose of this bulletin is to outline the field work done in the Riding Mountain forest reserve, located in Manitoba, to report conditions found, and to suggest tentative lines of manage-

ment. The subject-matter is discussed under the following general headings: Forest survey of the reserve, working plan report, ruling forest types, forest enemies, study of species, and utilization of species.

Forest fires in Canada during 1908, H. R. MACMILLAN (*Dept. Int. Canada, Forestry Branch Bul. 7, pp. 8*).—This consists of a record of the more important forest fires which occurred in the Dominion of Canada during the season of 1908, including also data on the losses resulting therefrom. The record as here given, although considered incomplete, shows the value of timber and improvements destroyed in 1908 to have been approximately $25,500,000.

Fire conservancy in Indian forests, B. SEN GUPTA (*Indian Forester, 36 (1910), No. 3, pp. 132–145, pl. 1*).—In this article the author presents evidence to show that natural reproduction in teak forests is more satisfactory over unprotected areas than in forests which are under continuous fire protection.

Progress report of forest administration in Baluchistan for 1908–9 (*Rpt. Forest Admin. Baluchistan, 1908–9, pp. 41*).—This is the customary annual report relative to the administration of the state forests of Baluchistan during the year 1909. The more important data relative to areas, forest settlements, the making of working plans, forest surveys, fire-protection work, silvicultural operation, yields, revenues, etc., are appended in tabular form.

Grazing leases in Australasia, A. C. VEATCH (*Amer. Forestry, 16 (1910), No. 2, pp. 101–103*).—The author briefly reviews the history of grazing leases in Australasia and gives a summarized table showing the present terms and conditions of grazing leases in that country.

Schlich's manual of forestry.—Forest utilization, W. R. FISHER (*London, 1908, vol. 5, 2. ed., pp. XXII+840, pls. 6, figs. 402*).—This consists of an English translation of K. Gayer's Die Forstbenutzung (E. S. R., 22, p. 449). The text of the original work has been considerably added to by notes and illustrations from the experience of the author and others in Great Britain, France, and India.

The industrial woods, J. BEAUVERIE (*Les Bois Industriels, Paris, 1910, pp. III+420+XII, figs. 53*).—This is a practical treatise on industrial woods. Part 1 discusses the structure and properties of wood, and part 2 consists of detailed studies of the various useful native and exotic woods of France.

An extensive bibliography of the subject is appended.

[Timbers from Mauritius] (*Bul. Imp. Inst. [So. Kensington], 8 (1910), No. 1, pp. 11–16*).—This is a brief report of a number of timbers forwarded to the Imperial Institute from Mauritius relative to their mechanical properties, working qualities, and general characteristics.

A critical revision of the genus Eucalyptus, J. H. MAIDEN (*Sydney, N. S. W.: Govt., 1903–1909, vol. 1, pts. 1–10, pp. 349, pls. 48; Index, pp. XII*).—This is the first of a series of papers, which the author has undertaken with the view of incorporating the recent facts gained from personal observations and elsewhere about this genus with the knowledge of the older authorities. Part 1 contains much introductory matter relative to the genus, including a list of the works consulted, and a detailed description of one of the species (*E. pilularis*), including notes supplementary to the description and notes on the synonyms. The succeeding parts of the volume deal in a similar manner with other species.

Rubber cultivation in Trinidad and Tobago, J. B. CARRUTHERS (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 64, pp. 3–9, pls. 7*).—A brief report on the present status of rubber culture in Trinidad and Tobago, including cultural suggestions.

Rubbers from Sierra Leone (*Bul. Imp. Inst. [So. Kensington], 8 (1910), No. 1, pp. 16–21*).—Analyses of rubber from *Funtumia elastica* and Landolphia are reported.

DISEASES OF PLANTS.

Diseases of garden crops and their control, N. J. Giddings (*West Virginia Sta. Bul. 123, pp. 18, pls. 5*).—This bulletin is one of a series of bulletins treating of practical questions in connection with the horticultural and trucking industries of the State. It gives descriptions and methods of treatment of a number of the diseases of the more common garden crops. The suggestions for treatment, which are drawn from various sources, are those that experience has shown to be the most efficient.

Report of the plant pathologist, B. M. Duggar (*Proc. Soc. Amer. Florists, 24 (1908), pp. 192–201*).—The author describes in a popular way the more common diseases of a number of ornamental plants and suggests methods of control.

Report of the entomologist and vegetable pathologist, H. Tryon (*Ann. Rpt. Dept. Agr. and Stock [Queensland], 1908–9, pp. 111–122*).—This is a report of work for the year ended June 30, 1909.

Brief mention is made of the occurrence of insect pests of horticultural crops, orchard crops and stock, and of diseases of field and garden crops, fruits, etc. The most noteworthy event pertaining to the occurrence of plant diseases was the discovery of the recent establishment of *Phytophthora infestans* in certain of the potato-growing areas of the State. The occurrence of this fungus and the nature of potato blight is considered at some length.

A contribution to our knowledge of Uromyces poæ, O. Juel (*Svensk Bot. Tidskr., 2 (1908), No. 2, pp. 169–174, figs. 2; abs. in Bot. Centbl., 111 (1909), No. 3, p. 58*).—A review is given of the recent investigations on the group of Uromyces formerly included as one species under *U. dactylidis*, but now divided into 4 well defined morphological and biological species, namely, *U. dactylidis*, *U. festucæ*, *U. ranunculi festucæ*, and *U. poæ*. The latter is divided by the author into 9 different biological forms.

Theoretical and practical control of Ustilago tritici and U. nuda, O. Appel (*Ber. Deut. Bot. Gesell., 27 (1909), No. 10, pp. 606–610*).—After a general discussion of the results with the various methods now in vogue for controlling the grain smuts, the author states that in recent hot-water experiments conducted by him with wheat and barley loose smuts, the best results were obtained by soaking the seed from 4 to 6 hours in water at a temperature of 20 to 30° C., and then treating with hot water at 50 to 54° or with hot air at the same temperature for 20 to 25 minutes.

The control of the loose smut of the barley, J. Sperling (*Illus. Landw. Ztg., 30 (1910), No. 9, pp. 66, 67*).—After a discussion of the value of hot water and hot air treatments for loose smut of grains, the author concludes from experiments on small plats and also on a field of more than 100 acres, that the successful control of the barley loose smut is obtained by a four-hour soaking of the barley at a temperature of 25° C. and a subsequent drying for 30 minutes in a hot air apparatus in which the grain reaches a temperature of 53 to 55°.

The susceptibility of different varieties of oats to Scolecotrichum, H. Nilsson-Ehle (*Abs. in Bot. Centbl., 111 (1909), No. 7, p. 165*).—After discussing the effects that different types of soil, such as moorlands, lime soils, etc., have on the disease, the author lists a number of varieties of oats common to Sweden which are more or less resistant to the fungus.

The influence of variety and temperature on stinking smut infection, L. Hecke (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 2, pp. 49–66, dgm. 1*).—Experiments were conducted with different varieties of wheat to ascertain their relative resistance to the smut, and also with reference to the influence of temperature on smut infection.

It was found that smut infection bears an inverse ratio to the temperature during the germination period of the grain, and that under certain conditions the less susceptible varieties were smutted more than the susceptible kinds. The conclusion is reached that stinking smut infection of wheat is favored by low temperatures during germination, or in other words by late fall as compared with early spring planting.

The treatment of stinking smut of wheat, D. McAlpine (*Jour. Dept. Agr. Victoria, 8 (1910), No. 1, p. 53*).—The author gave a practical demonstration to farmers as to the best methods of treating wheat for the prevention of stinking smut, using copper sulphate 10 : 50 and formalin 1 : 40. Eleven days after treatment the seed was planted, together with a similar plat untreated. At harvest time 1 per cent of smut was found on the untreated plat, while on the treated plats, for the copper sulphate 1 head was found smutted and for the formalin none.

Bunt tests, 1909, A. E. V. Richardson (*Jour. Dept. Agr. So. Aust., 13 (1910), No. 6, pp. 491–494*).—Experiments were conducted at the Parafield Experimental Farm in South Australia for the purpose of testing the efficiency of various fungicides for the prevention of bunt or stinking smut in wheat. Copper sulphate in 0.5 to 3 per cent solutions, formalin 1 : 480, 1 : 400, and 1 : 320, iron sulphate in 14 and 20 per cent solutions, and 2 proprietary fungicides were used. The smutted seed were immersed for 5 minutes in the solutions and the results as to germination and smutting for each experiment recorded.

It was found that the iron sulphate was worthless and the copper sulphate effective in controlling the smut, but deleterious to the germination of the seed. The formalin and one of the patent fungicides not only controlled the smut but also did not appreciably injure the germination of the wheat.

A new myxomycete, M. Molliard (*Bul. Soc. Bot. France, 56 (1909), No. 1, pp. 23–25*).—A parasitic fungus was found infesting the inflorescence of *Triglochin palustre*, forming galls similar to those produced on crucifers by *Cystopus candidus*. On examination it proved to be an undescribed species, for which the name *Tetramyxa triglochinis* is suggested.

The results of experiments in 1908 to control the cucurbit mildew, G. Köck (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 2, pp. 67–73*).—After giving a brief summary of the results obtained in previous experiments (E. S. R., 20, p. 247) in attempts to control cucurbit mildew (*Plasmopara cubensis*) the author records a series of experiments conducted in 1908, in which the cucumbers were cultivated (1) in flat rows, (2) in ridges, and (3) on wires, and sprayed at regular intervals with a 1 per cent solution of Bordeaux mixture. The wire culture method gave the best results in regard to attacks from the mildew, but the spraying in every instance decreased the yield of fruit.

Some fungus diseases of potatoes, F. Tidswell and T. H. Johnston (*Dept. Agr. N. S. Wales, Farmers' Bul. 31, pp. 25, pls. 8*).—Popular descriptions together with suggestions for control are given of the following diseases of potatoes: Late blight or rot (*Phytophthora infestans*), leaf spot or early blight (*Alternaria solani*), dry rot (*Fusarium solani* or *F. oxysporum*), scab (*Oospora scabies*), bacteriosis or brown rot (*Bacillus solanacearum*), and nematode diseases.

Wart disease of the potato, W. A. Orton and Ethel C. Field (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 52, pp. 11*).—A description is given of the wart disease of the potato, due to *Chrysophlyctis endobiotica*, attention being called to it on account of the recent discovery of its presence in Newfoundland (E. S. R., 22, p. 545). The nature of the parasite and the distribution of the disease are described at considerable length, and attention is called to the lack of leg-

islation quarantining the United States against the introduction of this and similar troubles.

A bibliography of the disease is given.

The late blight in tomatoes, D. McAlpine (*Jour. Dept. Agr. Victoria, 8 1910), No. 1, pp. 48, 49, figs. 2*).—Attention is called to the fact that the late blight of potatoes (*Phytophthora infestans*) was found infesting tomato plants in New Zealand. The disease generally attacks tomatoes similarly to potatoes, first appearing on the leaves, then on the stems, and finally causing the fruit to rot. Cross inoculation experiments on both tomatoes and potatoes proved the identity of the fungus.

A monograph of the Phragmidia on the genus Rubus, J. Vleugel (*Svensk Bot. Tidskr., 2 (1908), No. 2, pp. 123–138, pl. 1, figs. 4*).—A summary is given of the Phragmidia hitherto described for the genus Rubus, followed by a key to 8 species and varieties figured and described, together with a complete host index for each species noted.

The author describes as new *P. saxatile* and *P. rubi candicantium*.

The morphological and anatomical characters of roncet of the American grape in Sicily, E. Pantanelli (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 19 (1910), I, No. 3, pp. 147–154, figs. 2*).—Following a review of the literature on roncet and diseases that are often confounded with it, the author gives a detailed description and discussion of the constant and variable characteristics of the disease, both morphological and anatomical, especially as found on certain varieties of grapes.

A sun scald of the grape, P. Pacottet (*Rev. Vit., 32 (1909), No. 813, pp. 57–60, figs. 4*).—Attention is called to a disease prevalent in France, Algeria, Spain, Chile, and Argentina, due to a scalding of the skins of the grape berries from intense sunlight after several cool, cloudy days. The pulp of the berries in the scalded areas contracts and pulls away from the skin and the fruit finally rots from the subsequent invasion of fungi and bacteria. The disease usually appears at the period when the seeds are beginning to harden and is more severe on the white varieties and muscats than on other kinds, and on grapes grown in greenhouses than on those grown in the open.

Judicious pruning and destruction of the infected berries as they appear are recommended in the open vineyard, and, in addition to this, whitewashing the glass to modify the intensity of the sun's rays for those grown in greenhouses.

The conditions of sclerotia and sclerotia ring formation of Botrytis cinerea in artificial cultures, W. Reidemeister (*Ann. Mycol., 7 (1909), No. 1, pp. 19–44, figs. 3*).—The various conditions under which the fungus would form its sclerotia were determined by cultural experiments, these including tests as to the influence of the composition of the culture media, the quantity of the culture, the reaction (acid or alkaline) of the media, osmotic pressure, transpiration, etc.

The paper closes with a brief summary of the formation, size, number, and character of the sclerotia developed under these various conditions, and a discussion of the formation of conidia and appressoria and of correlation between sclerotia and conidia and between appressoria and conidia.

The development of some Ascomycetes, A. Potebnia (*Abs. in Bot. Centbl., 111 (1909), No. 7, pp. 163, 164*).—This is an elaborate taxonomic treatment of the 4 genera, Mycosphærella, Gnomonia, Glomerella, and Pseudopeziza.

Fire blight in fruit trees, W. B. Mack (*Nevada Sta. Bul. 66, pp. 62–64, pls. 2*).—The results of a bacteriological study of the fire blight in fruit trees are given in which the organism was separated, cultivated on media, and inoculation experiments by means of punctures made on different parts of the apple tree. As a result of the inoculations the characteristic symptoms of the disease

were produced and the organism was re-secured. Attempts to inoculate apples failed, the cultures remaining sterile.

The author undertook to locate the organism in the trees during the winter, making cultures from the inner bark of twigs, but the cultures remained sterile. Cultures taken from other parts seemed to indicate that the organism remains over winter in the inner bark of the larger branches, but dies in the smaller ones.

Bacterial blight of apple, pear, and quince trees, D. H. JONES (*Ontario Dept. Agr. Bul. 176, pp. 64, pl. 1, figs. 58*).—The author describes the bacterial blight of apple, pear, and quince trees, due to *Bacillus amylovorus*, giving accounts of the occurrence of the organism in the fruit, leaves, twigs, and trunk of the trees. The spread of the disease by means of various insects, pruning utensils, etc., is described, and suggestions are given for its control.

A bibliography is appended.

A disease of cacao fruits, F. GUÉGUEN (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 5, pp. 221, 222*).—A description is given of a disease of cacao fruits that is attributed to one of the molds which is apparently identical with or closely related to *Acrostalagmus vilmorinii.* This fungus has previously been found on the China aster (E. S. R., 18, p. 749).

Most of the cacao pods attacked had been perforated by a scolytid beetle, and it is thought that probably the fungus gained entrance in this way, although some specimens were found in which there did not seem to be any external opening. In this case the author believes that the penetration was through the conductive tissue of the style, the infection having been made when the plant was in bloom.

Diseases of coconuts, L. A. WATES (*Jour. Jamaica Agr. Soc., 13 (1909), No. 12, pp. 434–436*).—Three distinct troubles of young coconuts (bud rot, root disease, and borers) are often present in coconut plantations and it is hard to distinguish one from another.

In bud rot the trunk of the tree is not affected and does not show signs of sickness until the tree is dead. Root rot is recognizable by the exudation of a bright yellow gum beginning around the crown of the trunk at the ground level. All diseased bark and wood and adhering roots should be cut out as soon as observed, and the cut surface well cauterized with fire and then coated with a heavy application of tar. The borer may be recognized by a brown, watery exudation and can be destroyed by tarring the trunk.

The immunity of the Japanese chestnut to the black canker, A. PRUNET (*Bul. Soc. Nat. Agr. France, 69 (1909), No. 10, pp. 926–931; Rev. Vit., 33 (1910), No. 838, pp. 21, 22*).—The culture of chestnuts is seriously threatened by this disease in Portugal, Spain, and Italy, while in France it has destroyed over 25,000 acres of chestnut groves.

Experiments have been conducted for several years in various portions of France with the American chestnut (*Castanea dentata*) and the Japanese chestnut (*C. crenata*) to ascertain their relative immunity to this disease. The Japanese trees after periods of 5 to 7 years' growth in infected regions proved immune, but both native and American chestnuts in the same groves died from attacks of the fungus.

The systematic position of the oak mildews, F. W. NEGER (*Naturw. Ztschr. Forst u. Landw., 7 (1909), No. 2, pp. 114–119, figs. 3*).—In a study of the Oïdium forms of Phyllactinia and Microsphæra to determine if possible the identity of the oak mildew so prevalent in Europe in 1908, it was found that neither the conidia nor the haustoria of Phyllactinia are similar to those of the oak mildew. The author therefore concludes that the oak mildew is not a Phyllactinia but is probably the American mildew (*Microsphæra extensa*).

Observations on the morphology of the Oïdium of the oak, T. FERRARIS (*Ann. Mycol., 7 (1909), No. 1, pp. 62–73*).—Technical descriptions and comparisons of the various species of Oïdium found on oaks are given, together with a general discussion of the dissemination and systematic position of the Oïdium so prevalent in 1908.

The mildew of the oak, O. KIRCHNER (*Allg. Forst. u. Jagd Ztg., 85 (1910), May, pp. 158–161*).—The author, after calling attention to previous outbreaks of mildew on the oaks in Europe, discusses the characters, dissemination, taxonomic position, and control of the oak mildew so prevalent in 1908 throughout European countries.

The prevalence of the oak mildew in 1908, K. VON TUBEUF (*Naturw. Ztschr. Forst u. Landw., 7 (1909), No. 2, pp. 119–121; abs. in Bot. Centbl., 110 (1909), No. 24, pp. 627, 628*).—The author discusses the systematic position of the mildew, and its general distribution and severity throughout Europe. Two species of oaks (*Quercus rubra* and *Q. palustris*) were observed to be very resistant to this disease. A hot-water treatment was found of value in checking the ravages of the fungus on the young trees, without serious injury to the foliage.

The oak mildew in Austria-Hungary, G. KÖCK (*Österr. Forst u. Jagd Ztg., 28 (1910), No. 3, pp. 18, 19*).—It is stated that the oak mildew has appeared from year to year in this region with varying degrees of severity. The injury is caused by the interruption of assimilation and transpiration in the leaves which are attacked by the fungus. In many cases it causes the death of seedling oaks and young limbs, especially of *Quercus pedunculata, Q. sessiliflora* and *Q. cerris*, while *Q. rubra* is very resistant to the disease.

Dusting the trees with powdered sulphur or spraying them with Bordeaux mixture is recommended.

The Oïdium of the oak, J. V. D'ALMEIDA (*Rev. Agron. [Portugal], 6 (1908), No. 3, pp. 42–45*).—The author briefly discusses the character and dissemination of this disease, which appeared in Portugal in the summer of 1908, and suggests treatment with sulphur as a possible remedy.

A new parasitic disease of Juncus, E. J. SCHWARTZ (*Ann. Bot. [London], 24 (1910), No. 93, pp. 236*).—A brief account is given of a root disease of various species of Juncus, due to a mycetozoan parasite which the author calls *Sorosphæra junci*. The infection of the root takes place by the entry of an amoeba into a root hair and thence into the cortex. A detailed account of investigation into the life history of the organism is to be published later.

Azalea pontica and its parasites in Austria-Hungary, M. RACIBORSKI (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., 1909, No. 7, pp. 385–391, figs. 2*).—After discussing the range, habitat, and associated plants of this azalea, the author figures and describes a fungus (*Exobasidium discoideum*) which forms large galls on the leaves. Associated with this appears to be another Exobasidium that does not produce galls, but forms large circular, whitish areas. This fungus on further study may prove to be an undescribed species of Exobasidium.

A new Ramularia from South Tyrol, P. MAGNUS (*Ber. Deut. Bot. Gesell., 27 (1909), No. 4, pp. 214–222, figs. 5*).—After describing as new a leaf spot disease of *Polygala vulgaris* under the name of *Ramularia heimerliana*, the author gives a list of host plants for 6 parasitic genera of the Mucedinaceæ, namely Ovularia, Didymaria, Bostrichonema, Ramularia, Ramulaspera, and Cercosporella.

Copper fungicides, DUKE OF BEDFORD and S. U. PICKERING (*Woburn Expt. Fruit Farm Rpt., 14 (1909), pp. V+191; App. pp. 21*).—This is an extensive report of studies on fungicides, especial attention being given to those the efficiency of which depends upon copper compounds.

After a general review of fungicides and their action the author classifies the various copper preparations according to the action carbon dioxid exerts upon them. A large portion of the work is taken up with studies on the chemistry of Bordeaux mixtures of various kinds, some of the results of which have been noted elsewhere (E. S. R., 19, p. 450; 20, p. 163; 22, p. 455). A review is given of various reports on the fungicidal action of Bordeaux mixture, after which accounts are presented of the authors' experiments on the scorching effect and fungicidal action of various compounds.

The efficiency of fungicides is said to depend on their gradual solution, and the principal solvent agent is the carbon dioxid of the air. The best results are to be obtained with substances which are insoluble at the beginning, but from which small quantities of soluble copper are gradually liberated. The authors state that in making Bordeaux mixture to be economical of material, as little lime should be used as possible, consistent with precipitating all the copper. The lowest basic sulphate which it is possible to make in this way constitutes what has been called the Woburn Bordeaux mixture. This, according to its chemical composition, should be 2½ times as efficient as ordinary Bordeaux mixture.

An investigation was made of a form of paste which is practically identical with Bordeaux mixture. So far as present investigation is concerned, this seems to be satisfactory and equal to the ordinary freshly prepared Bordeaux mixture. Field trials on an extensive scale, however, are necessary before it can be unqualifiedly recommended.

Many points in connection with the manufacture and application of Bordeaux mixture were examined, and the conclusion is reached that the best way of making the mixture so as to get the precipitate in its most bulky condition is to have the lime solution as weak as possible and the copper sulphate solution as strong as possible. This is secured by slaking the lime, making it into milk of lime, and diluting with the amount of water required for the total amount of fungicide. This is allowed to settle for a few minutes and then added to the copper sulphate solution, which should be made in as small a bulk of water as possible.

In examining the relative efficiency of the different copper compounds it was found that the scorching action of the different salts on the leaves was independent of the nature of the copper salt taken and depended solely on the quantity of copper present. A scorching and fungicidal action of solutions containing 1 part of copper in 100,000 or 200,000 was observed and it was found to increase very slowly with the concentration. Copper in the electronegative condition was found to be no more effective than that in the electropositive condition, and it is very probable that it has no scorching or fungicidal action at all, although this could not be directly proved.

Many experiments were conducted to determine whether the effectiveness of copper fungicides could be increased by adding to them some substance which increased their power of wetting the leaves, such as saponin, but the results were negative. They did show, however, the danger of mixing any substances with fungicides or insecticides without a proper scientific examination of the changes which they may bring about. Saponin in certain preparations was found to entirely alter the nature of some copper compounds. Nicotin may be mixed with Bordeaux paste without any detriment.

The report concludes with an appendix by one of the authors on carbonates of copper and the cupricarbonates (E. S. R., 22, p. 304).

The substitution of lime-sulphur preparations for Bordeaux mixture in the treatment of apple diseases, W. M. Scott (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 54, pp. 15, pls. 3*).—On account of the injury reported as due to

Bordeaux mixture the author has been studying for three years substitutes for Bordeaux mixture with some success. The present publication gives an account of experiments carried on in Virginia, Michigan, and Arkansas to test the value of lime-sulphur sprays as fungicides for summer use. Four brands of the commercial lime-sulphur solution and a home-prepared solution were tested.

From the results obtained it appears that lime-sulphur preparations may be substituted for Bordeaux mixture in the treatment of apple diseases. A lime-sulphur solution diluted to about 4 lbs. of sulphur to 50 gal. of water appears to be the most promising preparation. This may be obtained by using the commercial solution at the rate of 1½ gal. to 50 gal. of water, or by preparing the lime-sulphur solution at home and so diluting it that each 50 gal. will contain 4 lbs. of sulphur. Experiments by the author in 1908 and 1909, as well as the published records of other investigators, indicate that lime-sulphur solution is apparently as effective as Bordeaux mixture in the control of apple scab and that the self-boiled solution is entirely harmless to apple foliage. The self-boiled lime sulphur was not as effective as the boiled preparation.

Some experiments were conducted in adding insecticides to the lime-sulphur mixtures, and it was found that combinations with Paris green or with arsenite of lime were quite injurious to the apple foliage, but that the addition of arsenate of lead was not injurious and that the insecticide did not even seem to lose any of its efficiency by reason of the combination.

ENTOMOLOGY.

Outlines of entomology, O. W. Oestlund (*Minneapolis, Minn., 1909, pt. 1, pp. 44*).—This work, an outcome of a series of lectures given at the University of Minnesota, is here adapted to a second year's course in animal biology, combined with the study of insects. The present part, devoted to anatomy and physiology, is intended to cover the first semester's work.

Insect and fungus pests of the orchard and farm, A. M. Lea (*Hobart, Tasmania: Govt., 1908, 3. ed., pp. 175, figs. 64*).—A third and enlarged edition of this work (E. S. R., 15, p. 597), which is by the Tasmanian government entomologist.

[Report of the department of entomology, 1908], S. B. Doten (*Nevada Sta. Bul. 66, pp. 26–36*).—The principal work of the year was a further study of the habits and structure of the European elm scale (E. S. R., 20, p. 655), particularly from the economic side. Because of the high cost of thorough spraying with lime-sulphur, as well as the danger of ruining paint on houses and fences in the immediate neighborhood of infested elms as before noted (E. S. R., 22, p. 661), experiments were made with other insecticides. Scalecide proved very efficient as a winter spray, a strength of 1 gal. to not less than 11½ gal. of water being recommended. Experiments made to determine the value of a jet of water as a remedial agent when used against female larvæ, which have successfully hibernated, show the treatment to be quite effective, all the trees thus treated being nearly free from the scale the following summer, although surrounded on all sides by badly infested elms. The author regards the washing of elms infested with this scale as thoroughly practical, particularly as the young trees are the worst infested and are at the same time most easily cleaned.

Investigations of the codling moth near Franktown have shown it to be quite highly parasitised. Several hymenopterous parasites representing the genera Pimpla, Lisonontini, Microps, Aenoplex, and Meraporus (?) were discovered to be at work on the larvæ.

Injurious insects and other animals observed in Ireland during the year 1908, G. H. CARPENTER (*Econ. Proc. Roy. Dublin Soc., 1 (1909), No. 16, pp. 589–611, pls. 5, figs. 8*).—Insects of economic importance during the year 1908 are reported under the headings corn and grass insects, cabbage and turnip insects, potato pests, mangel insects, orchard insects and mites, garden pests and forest insects.

[Reports upon insect injury to cultivated plants in Germany during 1908], G. LÜSTNER, MOLZ, and J. DEWITZ (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1908, pp. 82–93, 102–110, 112–129*).—Brief reports are here presented of injury by a number of insects.

G. Lüstner reports the abnormal occurrence of the woolly apple aphis (pp. 82–85), observations upon *Cheimatobia brumata* (pp. 85–87), the biology of *Rhynchites betuleti* (pp. 87, 88), the occurrence of the bud mite (*Eriophyes ribis*) of the black currant (pp. 88–90), the carnation fly (*Anthomyia antiqua*) (pp. 90, 91), a new mite disease of *Viola cornuta* (pp. 91, 92), and the nematode *Aphelenchus olesistus* and the injury which it causes to chrysanthemums (pp. 92, 93). Remedial experiments conducted against *Cochylis ambiguella* (pp. 102–108) and *Diplosis pirivora* (pp. 108–110) are also reported by the same author. J. Dewitz reports experiments with various insecticides used during 1907–8 in combating *C. ambiguella* and *Eudemis botrana* (pp. 112–129).

[Reports of the imperial entomologists for the years 1907–1909], H. M. LEFROY and F. M. HOWLETT (*Rpt. Agr. Research Inst. and Col., Pusa [India], 1907–1909, pp. 47–62*).—Brief reports of work by the imperial entomologist (pp. 47–56) and the second imperial entomologist (pp. 57–62) of India are presented.

Report of the entomologist [of Uganda], C. C. GOWDEY (*Colon. Rpts., Misc. [Gt. Brit.], No. 64, pp. 20–24*).—This is a brief report of the work accomplished since it was taken up on February 22, 1909.

It is said that but few insects have been recorded from this region. The ordinance requiring fumigation of imported plants enacted in 1908 is considered to afford sufficient protection under the present conditions. Two species of leaf-eating caterpillars (*Prodenia littoralis* and *Protoparce carolina*) and cutworms are mentioned as important tobacco pests. The most important coccids attacking citrus trees are the long or Glover's scale, the purple scale (*M. citricola*), and the pitted scale. The rice hispa is said to occur in the Protectorate. The mole cricket (*Gryllotalpa africana*) and a ground cricket (*Brachytrypes achatinus*) are also mentioned as rice pests.

A fruit fly (*Trypeta* sp.) has recently been found to attack the pod of the cacao. The eggs are laid under the peel of the pods in a puncture made by the short ovipositor. The young larvæ hatch from the eggs in from 12 to 15 days and immediately begin tunneling into the pod and feed upon the pulp surrounding the seeds, thereby preventing the normal development of the seeds. Full growth is attained in from 45 to 50 days, and the puparial stage lasts for from 15 to 17 days, so that the life cycle requires from 72 to 87 days for completion. It is recommended that all pods harboring the maggots be picked and destroyed either by incineration or burial to a depth of 2 feet or more.

Uganda insect pests (*Agr. News [Barbados], 9 (1910), No. 203, p. 42*).—This is a review of a pamphlet by C. C. Gowdey on the insects of Uganda.

The fungus-raising termites, K. ESCHERICH (*Biol. Centbl., 29 (1909), No. 1, pp. 16–27; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 1, p. 79*).—A study of the fungus gardens of termites, which are said to be of various sizes.

The larvæ are kept near the fungus and live on it. Upon the outside of the nests very frequently an agaric (*Volvaria eurhiza*) is found, especially after rain. If a portion of a nest is kept under a bell jar, the stomata of a Xylaria

make their appearance, showing that the fungus garden is not a pure culture of Volvaria alone. The latter has never been found apart from termite nests.

Contribution to a monograph of the gryllid genus Myrmecophila, F. SCHIMMER (*Ztschr. Wiss. Zool., 93 (1909), No. 3, pp. 409–534, pls. 3, figs. 26; abs. in Jour. Roy. Micros. Soc.* [*London*], *1910, No. 1, pp. 28, 29*).—In this monograph the author deals mainly with the forms found in ants' nests, especially with *M. acervorum*, which was the only species that could be procured alive and kept under observation. Only 11 forms of Myrmecophila are known but these are distributed over all 5 regions of the earth.

Exotic Thysanoptera in the Genoa museum of natural history, P. BUFFA (*Redia, 5 (1908), No. 2, pp. 157–172, pl. 1*).—Fifteen species are noted of which 5 are described as new. Two species are recorded from Central America and 2 from South America.

Aphidological studies, I, A. TULLGREN (*Meddel. Centralanst. Försöksv. Jordbruksområdet, No. 14, pp. 190, figs. 92*).—In this first part of the work on Swedish Aphididæ, the author considers the Pemphiginæ.

Following the introduction and a brief historical review of the knowledge of Swedish plant lice, their external anatomy and general classification are discussed. The classification and biology of the species of Pemphiginæ studied are then taken up under the 6 tribes into which the subfamily is divided. Vacunini is represented by 2 species, Hormaphidini by 1 species, Mindarini by 1 species, Pemphigini by 14 species (of which 4 are described as new), Schizoneurini by 4 species, and Anœcini by 1 species.

Coccidæ of Japan, III. First supplemental list of Japanese Coccidæ, or scale insects, with description of eight new species, S. I. KUWANA (*Jour. N. Y. Ent. Soc., 17 (1909), No. 4, pp. 150–158, pls. 3*).—In this paper are listed 18 species of Japanese Coccidæ studied by the author, since the paper previously noted (E. S. R., 19, p. 1157) was published. Eight of these species, representing the genera Asterolecanium, Lichtensia, Takahashia, Lecanium, Chionaspis, and Mytilaspis, are described as new to science; two are new to Japan, while the remaining species have been previously recorded from Japan by various writers.

Coccidæ of Japan, IV. A list of Coccidæ from the Bonin Islands (Ogasawarajima), Japan, S. I. KUWANA (*Jour. N. Y. Ent. Soc., 17 (1909), No. 4, pp. 158–164, pls. 3*).—An annotated list of 23 species collected in the Bonin Islands during the summer of 1907. Seven species representing the genera Ripersia, Dactylopius, Lecanium, and Mytilaspis are described as new to science.

The brown-tail moth: Its possible introduction into Ohio, N. E. SHAW (*Ohio Dept. Agr., Div. Nursery and Orchard Insp. Bul. 10, pp. 23, figs. 10*).—This is a general account of the brown-tail moth, webs of which with caterpillars have been entering Ohio on imported stock from France. The author concludes that under the present system of inspection there will be practically no danger of this pest's being disseminated on Ohio nursery stock should the insect become established in the field.

The larger corn stalk-borer, G. G. AINSLIE (*U. S. Dept. Agr., Bur. Ent. Circ. 116, pp. 8, figs. 4*).—This circular, which is practically a revision of Circular 16, gives an account of *Diatræa saccharalis*, the nature of its injury, life history, habits, and natural checks and preventive measures. Rotation has been found to be one of the best general preventive measures. "Another remedy, probably the best for this insect, is the thorough destruction, some time before the period of emergence of the moths in the spring, of all the stalks and stubble remaining in the field from the preceding crop."

Recent investigations relating to the control of the olive fly, A. BERLESE (*Atti R. Ist. Incoragg. Napoli, 6. ser., 60* (*1908*), *pp. 193–224*).—This is a brief review of the subject.

The horn fly, C. L. MARLATT (*U. S. Dept. Agr., Bur. Ent. Circ. 115, pp. 13, figs. 6*).—This circular describes the life history, habits, and methods of controlling *Hæmatobia serrata*.

The pest, first discovered in this country at Camden, N. J., in the fall of 1887, appears to have been introduced on European cattle in the early eighties. It is a blood-sucking insect but the damage occasioned by it is chiefly the result of irritation to cattle, which prevents proper feeding and normal assimilation of food, and thus causes loss of flesh or lessened milk production.

The eggs are laid singly on the surface of moist dung; the larvæ upon hatching descend into the dung, remaining, however, rather near the surface. "The time elapsing from the egg to the adult is from 10 to 17 days, and there are probably 7 or 8 generations annually in the latitude of Washington, with more in the South, and continuous breeding in a tropical region like the Hawaiian Islands. The winter habits as studied near Washington, D. C., indicate that hibernation normally takes place either in the adult stage or as puparia below the surface of the ground."

The natural enemies of the larvæ include a scarlet mite, several species of dung beetles, the Arizona dung-fly parasite (*Eucolia impatiens*) and 2 additional hymenopterous species (*Spalangia hirta* and *S. lanaiensis*). Means of control include the use of repellants, dips and traps against the mature flies, and the destruction of larvæ and pupæ in the dung. Two dipping vats used in the control of ticks in Texas and applicable to the destruction of this pest are described and illustrated. It has been found that if a splashboard be put near the top of the vat on either side, about 4 ft. above the level of the dip, the water will be thrown up violently as the animal plunges in and be caught by this splashboard and then thrown back as a spray, filling the air space above the animal and drenching and destroying the flies in their effort to escape.

Facing the boll weevil problem in Alabama, W. E. HINDS (*Alabama Col. Sta. Bul. 146, pp. 79–102, pls. 2, fig. 1*).—The life history and habits of the boll weevil, the nature of its injury, and methods of control are considered. It is stated that if the rate the weevil has been traveling eastward be maintained, the general line of infestation may be expected to reach the Mississippi-Alabama boundary by November, 1910.

A description of several of the insects most frequently mistaken for the boll weevil is appended.

The clover root-borer, F. M. WEBSTER (*U. S. Dept. Agr., Bur. Ent. Circ. 119, pp. 5, figs. 4*).—This beetle (*Hylastinus obscurus*), introduced prior to 1878 from Europe, where it is widely distributed, has become established in fields of red clover in some sections of the East and throughout the States of Oregon and Washington. It frequently commits serious depredations by burrowing in the roots, thereby destroying the plants.

In the East there is but one generation annually, though this appears to be long drawn out, and scattering individual larvæ and pupæ may be found throughout every month of the year. As a rule it passes the winter in the adult stage within the roots where it developed. During May it abandons the old roots and seeks out fresh plants or fields in which to lay its eggs. The eggs are mostly deposited between the middle of May and June 20, more often in the crown of the plant, sometimes at the sides of the root even 2 or 3 in. below the crown. These hatch in about a week, and the larvæ for a time feed in the excavation made by the mother, but soon burrow downward into the root, and before the first of August the majority of them have become fully

grown and passed into the pupal stage. By October nearly all have become fully developed beetles, but they make no attempt to leave the plant until the following spring.

In this country in addition to red clover, on which the species makes especially destructive attacks, it is known to attack mammoth and alsike clover and peas and may be expected to become destructive to alfalfa. In cases of extreme abundance, almost the entire main clover root, except the bark, is eaten, the substance being displaced by excreta, and the dead top either becomes detached of itself or is easily broken off if one attempts to pull up the plant. While an infested clover plant sooner or later succumbs to an attack by this insect, life may be lengthened or shortened by meteorological conditions. The only preventive method yet tried that gives any measure of success is summer fallowing as soon as the hay crop is removed.

The western grass-stem sawfly, F. M. WEBSTER and G. I. REEVES (*U. S. Dept Agr., Bur. Ent. Circ. 117, pp. 6, fig. 1*).—This stem sawfly (*Cephus occidentalis*) first observed in 1890, has since been reported at intervals as feeding upon grasses and occasionally upon wheat in Canada and the United States. Its history and distribution, habits and seasonal history are discussed and technical descriptions given.

"The injured stem appears discolored between the first and third joints and the larva may be seen through the translucent wall of the stem where it is eaten thinnest. In the case of wheat, the stalk often bends at this point, an inch or two below a joint rather than above as in Hessian fly injury, and the head falls to the ground shortly before harvest." It is a native species which has learned to attack wheat and rye, since these have taken the place of its native food plants—quack grass, wheat grass, brome grass, rye grass, and timothy. It was especially abundant in Agropyron along railroad embankments in North Dakota in 1905–6, so that in many clumps of this grass one-half of the heads were prematurely whitened.

An undescribed chalcidoid was reared from larvæ collected in North Dakota. A remedy which has been practiced to some extent is that of plowing down all stubble either in autumn or before June 15, at which time the adults may be expected to emerge and deposit eggs. Grass growing near the edges of fields should be mowed early in July, while the larvæ are small, to prevent them from maturing and attacking the crop of the following year.

A new chalcidoid genus and species of the family Mymaridæ from Illinois, parasitic on the eggs of the weevil Tyloderma foveolatum, A. A. GIRAULT (*Jour. N. Y. Ent. Soc., 17 (1909), No. 4, pp. 167–171*).—The species described as new (*Anaphoidea sordidata*) was bred from the eggs of a common weevil (*T. foveolatum*) collected from the stems of the weed (*Enothera biennis*. "The parasite is solitary as shown by dissection, the body of its pupa filling nearly the entire cavity of the host egg. It is not rare in this vicinity [Urbana, Ill.]."

Technical results from the gipsy moth parasite laboratory. I. The parasites reared or supposed to have been reared from the eggs of the gipsy moth, L. O. HOWARD (*U. S. Dept. Agr., Bur. Ent. Bul. 19, tech. ser., pt. 1, pp. 12, figs. 7*).—In this paper descriptions and notes are given on 3 genera and 3 species new to science, namely, *Schedius kuvanæ* and *Tyndarichus navæ* reared from gipsy moth eggs received from Japan and *Atoposomoidea ogimæ*, reared from cocoons of the *Glyptapanteles japonicus* also received from Japan. Other species noted are *Anastatus bifasciatus*, reared from egg masses received from all parts of Japan, also from eggs from Crimea and Hungary; *Pachyneuron gifuensis*, imported in gipsy moth eggs from Japan; and *Perissopterus javensis*, a scale parasite which is thought to have been reared from gipsy moth eggs

received from Japan. Mention is also made of a new species of Telenomus reared in Russia from gipsy moth eggs.

"Only two of the species, namely, *A. bifasciatus* and *S. kuvanæ* appear to be of primary importance, but it is obvious that once acclimatized these two species will perform a very considerable part in the reduction in numbers of the gipsy moth in the United States."

Observations on some European ants, W. M. WHEELER (*Jour. N. Y. Ent. Soc., 17 (1909), No. 4, pp. 172–187, figs. 2*).—Notes are given on 3 parasitic ants (*Formica rufa, Strongylognathus huberi*, and *S. huberi alpinus* n. subsp.) observed in Switzerland and Italy, and a diminutive nonparasitic form, that occurs on the Island of Lido near Venice.

A predaceous mite proves noxious to man, F. M. WEBSTER (*U. S. Dept. Agr., Bur. Ent. Circ. 118, pp. 24, figs. 13*).—This is an account of *Pediculoides ventricosus*, a supposedly beneficial mite which has become an external parasite of man as previously noted from other sources (E. S. R., 21, p. 587; 22, p. 783). The occurrence of this parasite, its importance as a beneficial predator and as a parasite of man, and its life history and habits are described at some length.

The epidemic of dermatitis, which occurred in the vicinity of Philadelphia, has been traced to this mite, which had increased rapidly, due to the abnormal infestation of wheat by one of its hosts, the Angoumois grain moth. Upon the emergence of the moths that infest the grain, they remain in the straw after threshing and are left to perish from starvation; thus when infested straw is used in the manufacture of mattresses, they make their way through the covering and attack the first animal host met with that furnishes food. Numerous instances are reported in which persons have thus been attacked.

In many of these cases, the wheat jointworm (*Isosoma tritici*) has been found to be responsible for the presence of the mite. Investigations carried on "at Lafayette, Ind., during December, 1909, and January and February, 1910, show that where straw is kept in masses, as in stacks and barns, the mites literally swarm through the straw, and as soon as an Isosoma or its parasites attempt to gnaw their way out through the cells in the straw, the mites enter and kill them before they are able to enlarge the opening sufficiently to enable them to make their escape; indeed not more than 5 per cent succeeded in escaping." The mite has thereby prevented *Diptropinotus aureoviridis* and other parasites from controlling the jointworm.

Investigations made in 1909–10 show that a period of from 6 to an indefinite number of days elapses between the time the female mite emerges from the abdomen of the mother until it produces young, depending upon the temperature. "For a temperature of from 90 to 100° F., 6 days elapses; for a temperature of from 80 to 90°, 7 days elapses; for a temperature of from 70 to 80°, 9 days elapses; for a temperature of from 60 to 70°, 13 days elapses; and for a temperature of from 50 to 60°, 28 days elapses. With temperatures lower than 50° it is doubtful if the mites would develop. . . . The life of the mites varied from 18 to an indefinite number of days; 43 days was the maximum age for those kept under the lower temperatures. The number of young produced by a single female varied considerably and variation was greater among individuals under like conditions than among those under variable conditions."

A predaceous and supposedly beneficial mite, Pediculoides, becomes noxious to man, F. M. WEBSTER (*Ann. Ent. Soc. Amer., 3 (1910), No. 1, pp. 15–39, pls. 3*).—This account is substantially noted above.

The transmission of the typhus fever of Mexico (Tabardillo) by means of the louse (Pediculus vestamenti), H. T. RICKETTS and R. M. WILDER (*Jour. Amer. Med. Assoc., 54 (1910), No. 16, pp. 1304–1307*).—The following summary and conclusions are drawn from the investigations here reported:

"It seems that *Macacus rhesus* can be infected with tabardillo invariably by the injection of virulent blood from man taken on the eighth to tenth day of fever. The blood should be diluted with salt solution, as stated previously. Attempts to maintain typhus in the monkey by passage through other monkeys were not successful. The monkey may pass through an attack of typhus so mild that it can not be recognized clinically. Vaccination results. The immunity test is a reliable proof of the previous occurrence or nonoccurrence of typhus at least within a period of one month. Typhus was transmitted to the monkey by the bite of the louse in two experiments, the lice in one instance deriving their infection from man and in another from the monkey. Another monkey was infected by typhus through the introduction of the feces and abdominal contents of infected lice into small incisions. Other experiments, in which the immunity tests have not yet been given, corroborate the carrying power of the louse."

A monograph of the Myrientomata, A. BERLESE (*Redia, 6 (1909), No. 1, pp. 1–182, pls. 17, figs. 14; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 1, p. 33*).—In this monograph the author establishes the order Myrientomata for certain primitive genera. Two families are recognized, namely Acerentomidæ and Eosentomidæ; the former includes 2 genera (Acerentomon and Acerentulus) and is represented by 8 species, of which 2 are new; the latter family is represented by a single genus Eosentomon and 2 species, of which one is new. The Acerentomidæ are without tracheæ or stigmata.

Investigation of the occurrence of silvertop in meadow grass in the neighborhood of Landquart, H. THOMANN (*Landw. Jahrb. Schweiz, 22 (1908), No. 5, pp. 254–267*).—It is stated that for a number of years there has been a considerable outbreak of silvertop in meadow grass at Landquart, Switzerland. The results of preliminary investigations extending through one summer, which were conducted by the author are here reported, and an annotated list is given of 9 species of insects, representing 5 orders, which were implicated in the injury in the district where the investigations were made. Observations upon the comparative frequence of injury to different species of grass are reported, 258 affected stalks representing 11 species of grass having been examined. The cause of injury to 107 of the stalks was determined, *Aptinothrips rufa* having been responsible for the injury to nearly one-third of these.

Insects injurious to sweet potatoes in New Jersey, J. B. SMITH (*New Jersey Stas. Bul. 229, pp. 3–16, pl. 1, figs. 3*).—Notes are presented on the principal insect pests of sweet potatoes in New Jersey.

The sweet potato flea beetle (*Chætocnema confinis*), which passes the winter in the adult stage, leaves hibernation in May and commences to feed on any of the convolvulids and as sweet potato plants are among the first to be found in the field, they bear the brunt of the earlier feeding. The plants are attacked during May as soon as set out, narrow grooves or channels being chewed out on either the upper or the lower side of the leaves. This attack, made while the plants are suffering from the shock of transplanting, causes the leaf to lose its vitality, turn brown and die. If the weather happens to be dry and hot the entire plant dies, or if it does not it grows so slowly that the hill is a poor one at harvest. By the middle of June the pest has practically disappeared and nothing more is seen of it until August, when it is again found abundantly on other convolvulids, though not as a rule upon sweet potatoes. Remedial measures consist of an application of arsenicals or a modification of cultural methods. Dipping the plants in a mixture of 1 lb. of arsenate of lead in 10 gal. of water before setting is recommended. By delaying transplanting, the beetles may be forced to bindweeds and other natural food plants and thus a large amount of the injury avoided.

Four species of gold-bugs or tortoise beetles are common in New Jersey. Hibernating in the adult stage, they appear in the fields in May and feed upon the leaves, leaving only the larger veins and leaf stalks. The larvæ, which commence to hatch out toward the end of the month, feed on the under surface of the leaves, eating the entire tissue. The second brood appears in the field in early August but is very little noticed. The two-striped sweet potato beetle (*Cassida bivittata*) is the most abundant and injurious of the 4 species. The golden tortoise beetle (*Coptocycla aurichalcea*), a species somewhat larger and less common, appears a little earlier in the season. The black-legged tortoise beetle (*Cassida nigripes*) is larger than either of the two above-mentioned species and much less common. The mottled tortoise beetle (*Coptocycla guttata*) is the least common of all of the species on sweet potato. The measures applied for the flea beetle will answer for the tortoise beetles as well.

Under some conditions and in some seasons cutworms are the source of considerable injury in sweet potato fields. Several species are concerned, *Euxoa messoria* being the most common.

Common insect pests of fruits in Wisconsin, J. G. MOORE (*Wisconsin Sta Bul. 190, pp 3–38, figs. 32*).—In this summarized account of the important insect pests of fruit in Wisconsin, the author first considers briefly the more important scale insects, namely, the oyster-shell scale, San José scale, European fruit scale, and scurfy scale. The insects mentioned as affecting the apple include the codling moth, tent caterpillar, fall webworm, cankerworms, apple-leaf roller (*Archips argyrospila*), apple-leaf folder (*Peronea minuta*), leaf crumpler, apple aphis, woolly aphis, apple curculio, and gall mites. The plum curculio and plum gouger are mentioned as affecting the plum, and the cherry fruit maggot and the pear slug as affecting the cherry. Of the insects affecting small fruits, mention is made of the currant aphis, currant saw-fly (*Nematus ribesii*), strawberry leaf roller, strawberry root louse (*A. forbesi*), and white grub.

A discussion of insecticides and spraying apparatus follows.

Control of the brown-rot and plum curculio on peaches, W. M. SCOTT and A. L. QUAINTANCE (*U. S. Dept. Agr., Bur. Ent. Circ. 120, pp. 7*).—Attention is called to the fact that since the plum curculio by its punctures opens the way for brown-rot infection of peaches, plums, etc., its control is of double importance. Experiments conducted during 1909 have shown that arsenate of lead can be used with self-boiled lime-sulphur mixture for spraying peaches and is entirely successful in controlling the scab, brown-rot, and curculio.

The results of spraying at Fort Valley, Ga., in 1909, briefly reported, show that 95.5 per cent of the fruit from a sprayed block was free from brown-rot, 93.5 per cent free from scab, and 72.5 per cent free from the curculio, against 37 per cent free from brown-rot, 1 per cent free from scab, and $2\frac{1}{2}$ per cent free from curculio injury on an unsprayed block. For the Elberta, Bell, Reeves, and other varieties of peaches of about the same ripening season, it is advised that the first application be made about the time the calyces are shedding from the young fruit with arsenate of lead at the rate of 2 lbs. to 50 gal. of 8 : 8 : 50 self-boiled lime-sulphur mixture; the second application from 2 weeks to about 1 month after the falling of the petals with the same materials, and the third application about 1 month before the fruit ripens with the self-boiled lime-sulphur mixture alone.

Results of spraying experiments, 1909, R. B. HOWE (*Illinois Sta. Circ. 137, pp. 39, figs. 11*).—Tests of arsenate of lead showed a solution of 2 lbs. to 50 gal. of water to be as effective a spray as 3 lbs., especially when applied alone. This insecticide also gave better results than Paris green whether used alone,

with Bordeaux mixture or with lime and sulphur. Results of experiments with other insecticides have been summarized as follows:

"Lime and sulphur when used as a summer spray by diluting the commercial material gave fine foliage and a good quality of fruit. The question of what dilution will be the most effective is unsettled.

"The second application of Bordeaux and arsenate of lead to control scab and insects was the most valuable in 1909. Bordeaux mixture made with 4 lbs. each of copper sulphate and lime and 2 lbs. of arsenate of lead to 50 gal. of water gave the best average results, while the same spray with 6 lbs. of lime gave the highest net value per bushel. The use of iron sulphate in Bordeaux as a 'dilution sticker' is better adapted as a spray for use after the fruits have attained some size than as a spray during the entire season. This spray is very adhesive, remaining on the tree until picking time, and being rusty brown in color is not as objectionable as Bordeaux for use late in the season. Target Brand Quick Bordeaux is efficient but costs one-third more than our regular homemade Bordeaux.

"The method of spraying heavily with arsenate of lead just as the bloom falls to control the codling moth, is not adapted to Illinois conditions, upon the basis of results of 1909 tests. The use of a weak Bordeaux and arsenate of lead applied in the same manner is more efficient."

Tables showing the results of tests of various brands of arsenate of lead and Paris green, tests of commercial and self-boiled lime and sulphur alone, and of arsenate of lead, the effective time of application of Bordeaux spray, value of arsenicals in Bordeaux mixture, value of Bordeaux mixture made with varying amounts of copper sulphate and lime, and tests relating to the method of slacking lime, etc., are appended.

Lime-sulphur wash (*Ontario Dept. Agr. Bul. 177, pp. 64, figs. 18*).—In the first of the two parts of this bulletin H. L. Fulmer reports upon the results of a chemical study of the lime-sulphur wash.

As the difficulty in handling both the chemical solution and the homemade concentrates is to know how much they should be diluted before applying, a large number of samples were collected and analyzed. The results are reported in tabular form and show a wide variation in the strength of the different samples, but it is thought that an average should give a fair standard. With this, knowing the strength or density of the wash required, by the use of the hydrometer any concentrated solution may readily be diluted to the desired strength.

The results of experiments on the preparation of homemade wash have been summarized as follows: "Normal limes, ranging from 48 lbs. and upward of pure calcium oxid per 100 lbs., are suitable for making lime-sulphur wash with a formula of 20 lbs. lime and 15 lbs. sulphur (or any formula having the proportions 4 lbs. lime to 3 lbs. sulphur). Flour and flowers of sulphur are of equal value for making the wash, provided they possess an equal degree of fineness and purity. Forty-five minutes to one hour is sufficient length of time to boil the wash, provided the boiling is vigorous. Increasing the proportion of sulphur to lime up to 1 : 1, or even higher in case of the use of a pure lime such as Beachville, will increase the strength of the wash and decrease the cost of production. Steam and open fire are of nearly equal value as sources of heat and energy for boiling the wash. The development of a green color during boiling can not be taken as an indication of the completeness of boiling with all limes. If a wash cools and crystallizes before it is applied it is not valueless. Heating up to 60 to 70° C. (140 to 158° F.) and stirring to break up the sediment and crystals at the bottom till the crystals dissolve will render the wash practically as efficient as before."

Experiments carried on with regard to other points show that "homemade concentrated lime-sulphur solutions comparing favorably with the commercial solutions can be made on the farm and at less expense. Lead arsenate and calcium arsenite can be added to lime-sulphur washes without causing any appreciable depreciation in the strength of the latter. The formation of crystals in lime-sulphur washes is mainly due to an excess of free lime, but contact with air will also cause concentrated lime-sulphur solutions to crystallize. If lime be added to concentrated lime-sulphur solutions, they will suffer extensive crystallization at once. Lime added to diluted concentrates will soon cause appreciable crystallization. Concentrated lime-sulphur solutions should be diluted first and then the lime added just immediately before spraying."

The second part, a practical and popular treatment by L. Ceasar, takes up the various details of preparation and use of the wash, including brief accounts of the insects and fungus diseases that can be controlled through its use.

The sulphur-lime wash, A. L. MELANDER and R. K. BEATTIE (*Washington Sta. Popular Bul. 28, pp. 4*).—A new edition of Popular Bulletins 2 and 16 previously noted (E. S. R., 19, p. 860; 21, p. 157).

Directions for making spray mixtures (*Illinois Sta. Circ. 136, pp. 15, fig. 1*).—Popular directions are given for the preparation and use of insecticides and fungicides, with a discussion of spraying machinery.

Spraying the orchard, C. G. WOODBURY (*Indiana Sta. Circ. 21, pp. 20, figs. 17*).—An account of how and when to spray and what to spray for.

Spraying the home orchard, J. G. MILWARD (*Wisconsin Sta. Circ. Inform. 12, pp. 8, figs. 4*).—A popular discussion of spraying machinery and materials, with directions for their use.

Spraying calendar for 1910, R. K. BEATTIE and A. L. MELANDER (*Washington Sta. Popular Bul. 27, folio*).—This is a wall spray calendar.

FOODS—HUMAN NUTRITION.

The action of saltpeter upon the color of meat, R. HOAGLAND (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 301–314*). The author summarizes the results of his investigations of the action of saltpeter as an agent in influencing the color of salted meat.

"The red color of uncooked salted meat to which saltpeter has been added as a preservative agent is due to the presence of NO hemoglobin.

"The NO hemoglobin is formed by the action of nitric oxid on hemoglobin.

"The nitric oxid is formed by the reduction of the nitrites within the meat.

"Saltpeter is reduced within the meat to nitrites, the reduction taking place equally well in either an acid or an alkaline medium.

"Saltpeter as such has no action as a flesh-color preservative.

"Nitrites as such have no action in preserving the natural color of meat.

"The brown color produced in meats cured with an excessive amount of saltpeter is due to the action of nitrites upon the hemoglobin."

The paper includes a bibliography of the subject.

The occurrence in pickled meats of bodies causing so-called "meat poison," F. W. ZWICK and A. WEICHEL (*Arb. K. Gsndhtsamt., 33 (1910), No. 2, pp. 250–281*).—The conclusion that the types of enteritis bacteria which are regarded as the cause of illness occur in pork and pickled gooseflesh of normal appearance was not substantiated by the author's investigations.

The analysis of flour with reference to its baking quality, T. KOSUTÁNY (*Ztschr. Gesam. Getreidew., 2 (1910), No. 2, pp. 36–41*).—A digest of data on this subject.

The gluten content and baking quality of German flours, M. P. Neumann and K. Mohs (*Ztschr. Gesam. Getreidew., 2 (1910), No. 2, pp. 31–36*).—The results of a number of tests with flour from winter and spring wheat are reported.

Milling and baking tests, F. D. Gardner (*Pennsylvania Sta. Bul. 97, pp. 18, fig. 1, dgm. 1*).—The data reported in this bulletin have been noted from another publication (E. S. R., 22, p. 466).

Bread and bread making, Helen W. Atwater (*U. S. Dept. Agr., Farmers' Bul. 389, pp. 47, figs. 7*).—In this, which is a revision of an earlier Farmers' Bulletin of the Department (E. S. R., 12, p. 279), the principal grains and flours are discussed as well as yeast and other leavening agents, household and commercial methods of bread making, the nutritive value and cost of different kinds of bread, and other similar topics. In preparing the bulletin for publication in its present form new material has been incorporated, particularly with reference to the nutritive value of bread made from different kinds of flour.

The general conclusion reached is that "as compared with most meats and vegetables, bread has practically no waste and is very completely digested. It is usually too poor in protein to be fittingly used as the sole article of diet, but when eaten with due quantities of other foods it is invaluable, and well deserves its title of 'the staff of life.'"

Army bread in France and other countries, G. H. Lemoine (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 9, pp. 269–275*).—This is a digest of data regarding the composition and character of French army bread as compared with that used in other countries.

On the relation of yeast to flavor in bread, Ruth A. Wardall (*Jour. Home Econ., 2 (1910), No. 1, pp. 75–91*).—From the results of studies with 33 yeast cultures, of which 18 were identified, the author concludes that the flavor of bread is not to be determined by yeast and possibly is not even affected by it. She believes, however, that if culture material suitable for both yeast and bread can be supplied, some of the yeasts which now fail in bread could be successfully used and they might have a possible effect upon the flavor.

"The simple process of selection as we have carried it on might be extended over a far greater number of yeasts, and from the number which fail here some might be found which under other conditions would be successful in bread. If there were any difference in flavor among those which have successfully fermented bread a greater stimulus would be given for further search among the yeasts.

"Since for obvious reasons the time allotted for fermenting bread is short it seems quite possible that an insufficient opportunity to develop flavor is given. The potato flasks after 24 hours in the incubator give no ethereal odor such as the wine maker detects in his must cultures. . . .

"From a knowledge of the individual yeast gained by experimenting a favorable culture material might be prepared, but if the yeast is to serve as a ferment for bread the material must be one which will not impair the taste or healthfulness of the bread; and if it is really to be useful, must not require anything which is unusual or difficult for the housewife to obtain. . . .

"In no case, either of the yeasts which failed to make bread or those which succeeded, was there any suggestion of sourness or any unpleasant taste. The yeasts which successfully fermented bread gave excellent loaves, which were noticeably sweet and of fine flavor, but differing so little among themselves that very slight, if any, difference could be detected on even the most critical tasting. Among the yeasts examined there seems to be no choice on the ground of producing flavor in bread."

In some of the experiments the effect of adding malt extract to the bread dough was studied. The paper is followed by a bibliography.

Yeast stimulants in the fermentation of dough, M. P. NEUMANN and O. KNISCHEWSKI (*Ztschr. Gesam. Getreidew., 2 (1910), No. 1, pp. 4–14*).—The effect on yeast fermentation of caraway, nutmeg, cinnamon, lemon peel, anise, ginger, and other flavoring and seasoning materials, and of alcohol, was studied experimentally.

According to the authors' conclusions, alcohol in a concentration not to exceed 1 per cent exercises a favorable stimulating effect on yeast fermentation, chiefly owing to the fact that it prevents the growth of undesirable bacteria. Caraway, the authors conclude, must be regarded as a stimulant of the yeast itself. Caraway, cinamon, and clove oil, were found to stimulate the growth of the yeast when present in very small quantities but had an opposite effect when present in greater quantity.

Mechanical kneading of bread, M. ARPIN (*Ann. Falsif., 3 (1910), No. 15, pp. 16–19*).—The data summarized are favorable to the use of kneading machines.

Analyses of canned peas and beans, showing composition of different grades, W. L. DUBOIS (*U. S. Dept. Agr., Bur. Chem. Circ. 54, pp. 9*).—In the usual commercial canning processes green peas separated from the pod, cleaned, and graded are blanched with hot water, and filled into cans containing simple brine to which sugar may be added. The cans are then capped, soldered, and processed. In another sort of canned peas, dried green, or Scotch peas are soaked for varying periods for the double purpose of softening and cleaning. The soaked peas are then blanched and canned in much the same way as fresh peas. It is often of importance to determine whether canned goods have been prepared from fresh or from dried peas and this problem was studied chemically with a view to supplementing the data dependent upon a physical examination.

"The distinction between soaked and fresh peas is, of course, made with some degree of certainty by the simple examination of the physical appearance of the goods, noting especially the maturity and firmness of the peas and the character of the liquor. Soaked peas are usually more or less broken and mashed, while the most matured show well-developed cotyledons and are packed in a liquor which is cloudy and starchy in appearance. It is seldom that the liquor in which soaked peas are put up is in the clear and limpid condition of that found on the fresh goods. The maturity of the peas can not be taken as conclusive evidence that the same have been soaked, however, because some of the oldest and best developed peas packed in the fresh state are very similar in appearance to the varieties which are soaked before canning. Neither can the appearance of the liquor be finally relied upon, since the matured fresh peas are sometimes found packed in a liquor which is not clear and is more or less starchy."

As shown by the analytical studies, the canned soaked peas had on an average a higher water and starch content and a somewhat higher specific gravity, and the author concludes that such determinations "afford results which may serve to substantiate to a great degree conclusions drawn from physical examinations of such canned goods."

The problem was also studied with Lima beans.

"The limited data obtained indicate that their water content when canned in the fresh state is higher than when they are prepared from soaked beans. The crude fiber and crude starch in the latter are higher than in fresh beans. Calculated to the dry basis these differences between the two grades of beans are not so pronounced, so that the variation seems to be largely one of water content. The soaked beans have a higher specific gravity, although the differ-

ence is not sufficient to make the determination one of much value in judging the product. With this vegetable, as with peas, great reliance must be placed on the physical appearance of the goods."

"An attempt to determine the ratio between the length, width, and thickness of the beans during the soaking process, showed that this ratio was practically the same for all grades of canned Lima beans examined. While some of the soaked beans appeared to have swelled materially the relative thickness was no greater, but the comparison is not deemed conclusive."

The recorded data furnish some information regarding the changes which take place during the growth and ripening of peas.

"As the pea matures the ash decreases, the starch increases, and the crude fiber decreases as a rule, while the conclusions to be drawn from the determinations of nitrogen and ether extract are less decisive. In the peas from one locality the amount of nitrogen decreased as the pea matured, whereas in the same variety from another locality this variation was not so apparent. Similar changes in composition appear in the canned vegetables. The analyses seem to indicate that during the process of canning the peas take up from 2 to 10 per cent of water. It is difficult from these results to draw any conclusions as to the changes taking place during processing. The principal value of the work . . . is to afford data for the comparison of commercial grades."

The influence of micro-organisms upon the quality of maple sirup, H. A. EDSON (*Abs. in Science, n. ser., 31 (1910), No. 791, p. 308*).—The vascular bundles of the maple tree are free from micro-organisms, but the tap hole, spout, and bucket are favorable places for their lodgment. The yeasts, mold spores, and bacteria were found in larger amounts as the weather became warmer, and the author was able to show by isolation and inoculation experiments certain specific groups of micro-organisms which cause the abnormal type of sap characterized by green, red, milky, and stringy appearance of the late runs.

The boiling of sugar with fruit, EDNA D. DAY (*Jour. Home Econ., 2 (1910), No. 1, p. 94*).—This is a brief note on the effects of adding sugar to acid fruit at the beginning and end of the cooking period. The fruits used were cranberries, grapes, and apples, and tests were also made of the comparative sweetness of solutions of the same strength of cane sugar and a mixture of levulose and dextrose.

The conclusion was reached that invert sugar is less sweet than cane sugar and that "in cooking such fruits as apples, cranberries, and grapes, while the product is slightly less sweet if the sugar is added at the beginning than it is if it is added at the end, still the difference is too small to be of practical importance."

As the author points out, this work, which was undertaken independently, confirms the results obtained by Miss Snow (E. S. R., 21, p. 460).

Some comments on the nutritive and economic value of nuts, G. M. NILES (*Ga. Bd. Ent. Bul. 30, pp. 12–20*).—The value of nuts as food and related topics are discussed, and a test is briefly reported in which nuts formed the chief source of protein and fat in the diet of healthy men. Judging by the weight of the subjects and the cost of the diet, the author considers that the results are favorable to the use of nuts.

Concerning the use of lactic acid in condiments, E. S. FAUST (*Chem. Ztg., 34 (1910), No. 8, pp. 57–60*).—In a study of the possible use of lactic acid in place of citric, tartaric, and acetic acid in making bonbons, effervescent drinks, and fruit juices, a number of investigations were undertaken with small animals to determine the fate of lactic acid in the organism and to ascertain whether its

use induced pathological symptoms. From the studies of the urine and other data the conclusion is reached that up to a maximum concentration of 5 per cent free acid no harmful effects were noted, and therefore, in the author's opinion, lactic acid should be harmless when used in the manufacture of food accessories.

The need of state and municipal meat inspection to supplement federal inspection, A. M. Farrington (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 83–96, figs. 6; Circ. 154, pp. 14; abs. in Nat. Provisioner, 41 (1909), Nos. 13, p. 17; 21, pp. 17, 21*).—In this article, which is based on a paper presented at the meeting of the Association of State and National Food and Dairy Departments, at Mackinac, Mich., August, 1908, the author gives a brief outline of the meat inspection work in the United States, extent of slaughterhouses without government inspection, and the evils of such slaughterhouses, and makes a plea for a system of inspection of all of those which do not come under the provisions of the act authorizing federal inspection.

Sanitary inspection and commercial value for food purposes of pregnant swine, H. Lehnig (*Ueber die sanitätspolizeiliche und volkswirtschaftliche Bedeutung der Trächtigkeit der Schlachtschweine. Inaug. Diss., Univ. Bern, 1909, pp. 21*).—According to the author's investigations, from the standpoint of sanitary regulations this condition exercises an unfavorable effect upon the meat. As regards commercial value, there are many reasons against the use of such swine as food.

Food inspection decisions (*U. S. Dept. Agr., Food Insp. Decisions 115, pp. 4; 116, p. 1*).—These decisions treat, respectively, of the use of geographical names and an amendment to Food Inspection Decision 74 (E. S. R., 19, p. 262), which has to do with the importation of stearin under bond. A title index of Food Inspection Decisions 40–115 is also included in Food Inspection Decision 115.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 215–218, 220–221, pp. 2 each; 223, pp. 3; 224, pp. 2; 225–226, p. 1 each; 227, pp. 2*).—These notices of judgment have to do with the adulteration of liquid eggs and desiccated egg; the misbranding of olive oil, preserves, headache tablets, and laudanum; and the adulteration and misbranding of coffee, hydrogen peroxid, strawberry extract, turpentine, and camphor.

Official inspections (*Maine Sta. Off. Insps. 18, pp. 181–192; 21, pp. 37–44*).—The subjects discussed in these reports are short weight creamery butter, pork sausage, compressed yeast, and the results of the examination of vinegar and drugs.

[Papers on food and nutrition at Illinois Farmers' Institute] (*Ill. Farmers' Inst. Bul. 14, pp. 79–120*).—These papers include, among others, the following: The Nutritive Ratio of Food, by Mrs. H. A. McKeene, with sample menus designed to supply balanced meals; suggested menus by several others; and a Classified List of Foods, by Elizabeth C. Sprague, in which foods are grouped according to the proportion of total nutrients and the proportion of proteids, fats, and carbohydrates which they contain.

Cookery at high altitudes, Mrs. A. Anderson (*Boston Cooking-School Mag., 14 (1910), No. 8, pp. 372, 373, XVI, XVIII, XX*).—On the basis of personal experience the problem of cooking at high altitudes is discussed, and directions are given including recipes.

The art of eating, F. X. Gouraud (*Que Faut-Il Manger: Manuel d'Alimentation Rationelle. Paris, 1910, pp. 327; rev. in Lancet [London], 1910, I, No. 9, p. 589*).—The source and preparation of different foods and their composition are discussed, as well as the influence which they are supposed to exert on general nutrition. From such considerations the author deduces reasons for the use or rejection of particular foods and discusses the rational diet. He

defines a rational diet as one which, while pleasant to the taste, will maintain body equilibrium and facilitate the working of the organs, and reduce to a minimum the work which it of necessity imposes on them.

Investigations on the etiology of pellagra, W. H. BUHLIG (*Ill. Bd. Health Mo. Bul., 5 (1909), No. 7, pp. 417–435, figs. 2*).—In an extended study of pellagra at the Peoria State Hospital, South Bartonville, Ill., various questions were taken into account as to the possible relation of this disease to diet, and in addition, the results are reported of examinations of blood, excretory products, the water supply of the institution, and similar matters.

"Aside from the consideration of whether corn has anything to do with the causation of pellagra, the food of pellagrous patients in our judgment is a subject of first importance and not only is the present food of the patients to be taken into consideration, but also that of these people before they came into the institution. . . .

"It is a striking fact that practically all cases of pellagra occur in the undernourished, or that relatively few occur in the well nourished. Two elements present themselves here: The food ingested and the ability of the individual to metabolize his food. . . . From the numerous dietary lists of the institution that we have examined we will venture the opinion that the protein intake is very low, but that probably each individual, because he may help himself, will get as much as he actually needs. . . . The question is whether this low protein is harmful, or whether the high carbohydrate is, or whether both together are. The writer knows of no experiments on these questions covering a sufficient length of time, and is not in a position to pass on the matter. The whole subject of the food and metabolism of these patients needs investigation and should not be neglected in a thorough study of the disease."

In connection with culture tests with moldy corn, tests were also made with cooked corn, as some molds are known to be very resistant to heat and the idea has been advanced that such organisms may survive cooking. "We can only state a few experiments made by us from corn meal mush and hominy after it had been made in the usual way at the institution by boiling about 2 hours. We can not see how anything living can withstand such treatment and our two cultures of corn meal and two of hominy on gelatin bore us out by being sterile after several weeks."

Observations on pellagra at the Peoria State Hospital, Peoria, Ill., J. F. SILER and H. J. NICHOLS (*Ill. Bd. Health Mo. Bul., 5 (1909), No. 7, pp. 437–478, figs. 8*).—In connection with the study of pellagra information is summarized concerning the diet of the institution and other matters.

Taking a period of 4 years, the average number of patients at the institution has ranged from 1,725 to 2,200 annually, and the cost of food from 9.6 to 15.5 cts. per patient per day. In addition to the general diet for the majority of the patients, special diets are prepared for certain groups and for attendants.

According to the authors, "the diets are good as institutions go. The daily food in the general diet averages about 2,000 to 2,500 calories, which is made up approximately of 30 gm. proteid, 70 to 80 gm. fat, and 300 to 400 gm. carbohydrates. Meat is given only twice a week. On the whole it may be said that the food supply is satisfactory except that the general diet is somewhat deficient in proteids."

At the time the investigations were made there were 2,150 inmates at the institution, of whom the majority had been almshouse and asylum inmates for many years. Of these persons 175 were pellagrous.

In considering the possible relation of corn in the diet to the occurrence of pellagra, it is stated that the patients on the general diet received rather more

corn than the average for the whole institution population, but on an average not more than 2 oz. per day. In the author's opinion this amount would be too small to accord with the theory that good corn may be injurious if eaten in large quantities.

The corn used at the institution was of good quality, the corn meal was freshly ground, and it is stated that none of the corn products were spoiled in the sense of being moldy, damp, hot, or of bad odor or taste.

The theory has been advanced that pellagra may be due to toxins which develop in the intestine by the action of fungi or bacteria on a corn diet. The authors state that "in regard to molds, several trials were made, but no molds were found which survive the heat of cooking. Of course this does not exclude them, but it makes them seem less likely as a cause. On the other hand, a spore-bearing bacterium was repeatedly found in corn meal and hominy which survived steaming for 2 hours, and seems to offer possibilities. This is a motile, spore-bearing, Gram negative bacillus which produces a red coloration on corn and an odor like that of ham. . . .

"The most promising field for investigation seems to be along the line of an intoxication produced by bacterial action on corn products and possibly other carbohydrates in a damaged intestine, and this will be followed up. Several instances have come to our notice of a toxic action for animals, first of an excessive corn diet, also of a diet of corn gluten infected with molds; and there are no doubt several kinds of disease connected, in some way, with corn, but pellegra, if associated with corn, must be due to one, not to several, kinds of corn poisoning.

"The outstanding facts about corn raising in the last 15 years are, that the shelled corn is marketed 4 to 8 weeks earlier than it used to be; that the time of weathering and drying on the stalk is cut short, and that more trouble is experienced in handling the corn and preventing it from going bad. These facts, together with the considerable increase of the use of corn products in past few years, may prove to be of significance."

In addition to hygienic measures with reference to water supply and sewage and similar precautions, the authors recommend the "elimination of corn from the diet of the pellagrous and more debilitated patients, and continued care in the purchase of corn products. . . .

"At present, we would recommend that the purchase of kiln-dried meal be continued, and that any other types of meal purchased be freshly milled and made of the best No. 2 corn. No corn should be used in the diet of the sick suffering from intestinal diseases."

Attempt to determine the ration of soldiers in active service, L. PERRIER (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 9, pp. 276–286*).—Studies were carried on during military maneuvers. The two rations studied supplied in round numbers per man per day 132.3 gm. protein with 4,288 calories of energy, and 139.7 gm. protein with 4,305 calories of energy, respectively. In view of the heavy work performed the author concludes that such figures represent minimum energy values with respect to the rations for active campaign service.

Geography in relation to human nutrition, A. WOEIKOF (*Géographie, 20 (1909), Nos. 4, pp. 225–240; 5, pp. 281–296; abs. in Presse Méd. [Paris], 1910, No. 2, pp. 98, 99*).—The effects of environment and abundance of foodstuffs in different regions are discussed with reference to existing food habits. In the author's opinion, natural conditions will in the future tend to bring about an increased use of vegetable foods and a diminished use of animal foods, and he believes that the human race will eventually eliminate animal food products from the diet.

Concerning the digestibility of protein, fat, and carbohydrates, alone and in combination, A. V. SIVRE (*Diss. Army Med. Acad. [St. Petersb.], 1909; rev. in Vrachebnaya Gaz. [St. Petersb.], 1909, No. 36, p. 1067; Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 23, pp. 889, 890*).—The results of 99 experiments are reported in which dogs with fistulæ were used as subjects.

According to the author's results, meat (300 gm.) was rapidly digested in the stomach so that after an hour 40 per cent of it had passed on into the intestine. After 3 hours, the stomach and the greater part of the intestine was quiet. The ileocæcal portion, however, maintained increased work of secretion. Five hours after taking food the stomach was empty of food residues. Meat digestion, therefore, takes place principally in the stomach and chiefly during the first 2 or 3 hours after food is taken. The part played by the intestine is chiefly that of absorption.

Fat (25 gm. melted lard) passed from the stomach into the intestine in small quantities during the first 5 or 6 hours of digestion without undergoing change in its composition. After this the fat began to digest quickly and was principally absorbed in the ileum.

Starch (60 gm. with 230 cc. water) passed rapidly into the intestine where the digestion of starch takes place for the most part. Its digestion is most active in the lower portion of the intestine.

When meat and fat were fed together, the course of digestion of each was the same as noted above, except that the digestibility of the meat was delayed and the period of digestion lengthened. While the digestibility of fat was not influenced by the presence of meat, its absorption was increased.

When meat and starch were fed together, the length of the period of digestion increased and the absorption also increased. When starch and fat were fed together, the starch remained for a longer time in the stomach than when fed alone, but the fat passed a little more rapidly into the intestine. The absorption of carbohydrate was diminished and that of the fat increased over the values obtained when each was fed alone.

When all three nutrients were fed in combination, the meat exercised the greatest influence in the upper third of the intestine and the starch in the lower third. The amount of chyle found in any given portion of the ileum when the nutrients were fed in combination was equal to the sums of the quantities which each of the components of the ration would furnish alone. It may be concluded, therefore, that the intestine reacts in a typical manner toward each nutrient regardless of whether it is fed alone or in combination.

Protein synthesis in the animal body J. OLINGER (*Eiweissynthese im Tierischen Organismus. Inaug. Diss., Univ. Bern, 1908, pp. 22, pl. 1*).—In the experiments reported the author fed a dog with material obtained by thoroughly digesting horseflesh successively with gastric juice, pancreatin, and extract of the mucous membrane of the intestine. The mixture of monamino acids obtained was fed with sugar and fat and was readily eaten. The dog remained in good condition when fed this material, but this was not the case when fed the products obtained by the cleavage of milk powder, probably, the author believes, owing to the fact that the material thus obtained contained much fatty acid.

The effect of massage on the metabolism of proteid, D. RANCKEN (*Skand. Arch. Physiol., 23 (1910), No. 3-4, pp. 279-294*).—In the experiments reported the author was not able to note a constant increase in the excretion of nitrogen as a result of massage.

The biological value of nitrogenous substances in different foods and the physiological nitrogen minimum, K. THOMAS (*Arch. Anat. u. Physiol., Physiol. Abt., 1909, pp. 219-302; abs. in Zentbl. Gesam. Physiol. u. Path. Stoff-*

wechsels, n. ser., 5 (1910), No. 3, p. 98).—The author studied the minimum nitrogen requirement with a considerable number of foods.

In experiments with potatoes, with wheat flour, and with milk (human), each used as the sole article of diet, the minimum requirement of nitrogen was found to vary and to be higher than in fasting. In general, the minimum requirement was higher the more nitrogen the food supplied. If, however, owing to a large supply of carbohydrate, the nitrogen was not needed as a source of energy, equilibrium was reached with a smaller quantity of nitrogen. Nitrogenous material in wheat flour, potatoes, and milk is used in different degree to meet the proteid requirements of the body. In other words, nitrogen minimum varies not only with the composition of the diet and the proportion of protein, carbohydrate, and fat, but also with the source of protein.

Additional experiments were made in which other foodstuffs were tested in rations which contained an abundance of carbohydrate. In the case of a fish, a milk, and a rice diet, the nitrogen excretion was only slightly increased and was increased most with wheat flour and corn meal. Under proper conditions, the nitrogen excretion was smaller on a meat diet than on a nitrogen-free diet.

The biological value of nitrogen from different sources is discussed at length and the results expressed numerically.

Protein requirement and a vegetarian diet, K. THOMAS (*Umschau, 14 (1910), No. 4, pp. 67–70*).—The investigations, noted above from another source, are discussed particularly with reference to general dietetics.

On the basis of these investigations the author calculates the amount of body proteid which 100 gm. of food ready to serve would replace, the values being 23.1 gm. for beef; 18.4 gm. for crabs; 16.4 gm. for fish; 2.1 to 6.2 gm., according to its water content, for peas porridge or puree; 3.1 gm. for milk and bread; 2.1 gm. for spinach; 1.9 gm. for rice and noodles; 1.6 gm. for potatoes; 1.4 gm. for cooked cauliflower; 1.1 gm. for corn meal; and 0.5 gm. for cherries. The animal foods are better utilized by the body than the vegetable foods. Attention is especially directed to the high value of fish flesh.

According to the author, a vegetarian diet, which generally implies low protein, would ordinarily suffice for an agricultural population owing to the character of the work performed, but the question is raised as to whether such a diet would be rational. For an urban population he believes that animal foods are desirable. In his summary, the author notes that when the diet is not entirely adequate loss in body weight results, and since the protein requirement is proportional to the body weight, the amount required under such conditions would be lowered and the body could more readily meet its needs with strictly vegetarian diet. However, he believes that under such circumstances the resistance to infectious diseases would be lowered.

Experiments on the comparative value of animal and vegetable food and on the minimum proteid requirement, P. ALBERTONI and F. ROSSI (*Arch. Ital. Biol., 51 (1909), p. 385; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 3, pp. 113, 114*).—The investigations reported have been noted from a summary published elsewhere (E. S. R., 20, p. 965).

Phosphorus metabolism in man, Ö. HOLSTI (*Skand. Arch. Physiol., 23 (1910), No. 3–4, pp. 143–153*).—In general, the author concludes from experiments on the income and outgo of phosphorus, calcium, and magnesium that phosphorus is excreted regularly in the urine and feces and that differences noted when phosphates are fed are not constant and characteristic. On the other hand, phosphorus added to the diet exercised a marked effect on calcium, only 7 or 8 per cent being excreted in the urine as compared with 20 to 28 per cent in a ration without added phosphate. Presumably, the greater part of the cal-

cium in the feces consists of calcium phosphate which was not resorbed. The effect of phosphorus on magnesium was of the same character as that on calcium but was less marked.

Metabolic minimum in man, R. TIGERSTEDT (*Skand. Arch. Physiol., 23 (1910), No. 3–4, pp. 302–304*).—In connection with a brief summary and discussion of recent data, the author concludes that 1 calorie per hour per kilogram of body weight is to be regarded as the minimum value for energy in an adult man.

The influence of dietary alternations on the types of intestinal flora, C. A. HERTER and A. I. KENDALL (*Jour. Biol. Chem., 7 (1910), No. 3, pp. 203–236, pls. 3*).—The experiments which are reported were carried on with kittens and monkeys, and the results obtained, according to the authors, show that an abrupt change in dietary from a dominantly protein diet (meat and eggs) to a milk and sugar diet is followed by an alternation of physiological conditions with respect to the nature of the intestinal flora, the putrefactive products in the feces and urine, and in certain clinical conditions.

"The chief characteristic of the bacterial change is the gradual but rapid substitution of an acidophilic nonproteolyzing type of flora for a strongly proteolyzing type. The chief feature of the putrefactive conditions in the intestine is the reduction of the indol, skatol, phenol and bound hydrogen sulphid and a diminution in the indican and aromatic oxyacids of the urine. Clinically the most striking feature of the change in diet is (in monkeys) an improvement in spirits and activity which may safely be construed as showing a markedly improved sense of bodily and psychical well being.

"It seems fair to ascribe these very definite changes of melioration in part to a somewhat reduced intake in protein material, since in the change from a meat or egg diet to a milk and sugar diet, there has generally been some diminution in protein. It is well known that, other conditions remaining unchanged, a diminution in protein intake is followed by diminished intestinal putrefaction. It is our opinion, however, that the mere reduction in protein in our experiments is not adequate to explain the changes noted. Nor is it likely that the change in the chemical nature of the proteins ingested, as from the protein of beef or eggs to the protein of milk, is a prominent influence in effecting this change. It seems much more probable that changes in the flora observed by us are due mainly to the influence of the carbohydrates and that the diminished intestinal putrefaction is due to the combined influence of a diminution in protein and the addition of carbohydrate materials to the diet.

"One of the most interesting features of our studies is the extensive bacterial degeneration which follows the change from one diet to another. It is possible that in conditions of disease of the intestinal tract where undesirable bacteria abound both on a protein diet and on a diet rich in carbohydrates, frequent alternations in the chemical nature of the diet are beneficial by interfering with the establishment of any one type of bacteria in the intestine.

"The physiological alternations in the flora which we may claim to have established by our studies have been noted by us only in normal animals. We have as yet made no effort to study the effects of diet on animals in which the digestive tract is the seat of inflammation. It is our intention to determine what influence, if any, is exerted by pathological processes on the laws of bacterial alternations which we have noted in health.

"We are unable to state whether the processes which we have studied in animals hold sway in man but consider it likely that analogous conditions will be found to exist."

For earlier work see a previous note (E. S. R., 22, p. 373).

Concerning the occurrence of erepsin in feces, F. FRANK and A. SCHITTENHELM (*Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 23, pp. 881, 882*).—According to the authors' investigations, the feces contain erepsin or, at any rate, a ferment which has the same properties.

Progress in nutrition, 1908–9, C. F. LANGWORTHY (*Jour. Home. Econ., 2 (1910), No. 1, pp. 35–72*).—A digest of data with special reference to work reported in the United States and Canada.

ANIMAL PRODUCTION.

Digestion experiments with native forage plants, S. C. DINSMORE (*Nevada Sta. Bul. 66, pp. 37–48, pl. 1*).—Chemical analyses and digestion experiments were made with the French pea, hairy vetch, willows, and different varieties of alfalfa grown from seed which was obtained from Ecuador, Arabia, Arizona, Texas, Montana, and Mexico. The digestion coefficients obtained with sheep are given in the following table:

Average digestion coefficients of alfalfa and other forage plants.

Kind of plant.	Dry matter.	Protein.	Fat.	Nitrogen-free extract.	Fiber.	Ash.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Alfalfa (Ecuador)	64.55	83.57	62.16	69.98	45.23	60.74
Alfalfa (Arabia)	64.93	77.73	47.08	61.44	41.81	53.20
Alfalfa (Arizona)	66.75	83.79	56.84	78.60	36.57	53.16
Alfalfa (Texas)	64.37	82.43	56.89	75.83	36.86	46.70
Alfalfa (Montana)	68.42	84.53	64.99	72.93	58.28	52.04
Alfalfa (Mexico)	61.90	80.68	61.42	75.85	19.35	49.05
French pea (Lathyrus)	67.72	81.91	59.14	75.49	49.42	67.17
Hairy vetch (*Vicia villosa*)	61.47	70.52	56.65	65.21	54.03	62.85
Willows (*Salix exigua*)	53.06	29.04	69.88	66.40	41.73	32.22

The results of chemical analyses of partially dried native forage plants were as follows:

Chemical composition of partially dried native forage plants.

Kind of plant.	Water.	Protein.	Fat.	Nitrogen-free extract.	Fiber.	Ash.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Shad scale (*Atriplex canescens*)	6.60	14.50	2.99	39.60	18.50	17.41
Sand bunch grass (*Eriocoma cuspidata*)	6.41	9.93	3.01	36.45	34.02	10.18
False buckwheat (*Eriogonum heermani*)	6.70	9.81	7.14	46.56	22.98	....
Spring salt brush (*Atriplex confertifolia*)	6.59	7.25	2.94	5.74	57.76	19.72
Rabbit brush (Chripothamum)	7.36	5.37	12.38	42.98	26.40	5.51
Small rabbit brush (*Gutierrezia divaricata*)	6.41	6.56	5.49	43.27	31.18	7.09
Hop sage (*Grayia polygaloides*)	7.94	18.62	4.18	46.57	12.68	10.01
Wild barley (*Hordeum nodosum*)	.82	15.50	4.03	46.74	25.09	7.82
Poa nevadensis	6.46	7.69	2.83	42.64	34.51	5.87
Astragalus mortoni	7.23	20.44	8.77	36.40	18.61	8.55

Digestion experiments on the range, P. B. KENNEDY and S. C. DINSMORE (*Nevada Sta. Bul. 71, pp. 7–38, pls. 16*).—Digestion experiments were made on the range with a number of native forage plants of the Truckee Valley. Analyses of these plants are also reported and they are illustrated and briefly described.

The Indian potato was one of the best liked forage plants on the range. Balsam root sunflower was relished better than the common sunflower. The wild dandelion was well eaten but not readily digested. Bitter brush was not well liked. The bitter vetch was not liked and had a poisonous effect, so that the experiment was kept up for only 3 days.

The digestion coefficients obtained with sheep were as follows:

Average digestion coefficients of native forage plants obtained with sheep.

Kind of plant.	Dry matter.	Protein.	Fat.	Nitrogen-free extract	Crude fiber.	Ash.	Nutritive ratio.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	
Indian potato (*Antænia gairdneri*)	66.59	56.74	77.19	65.21	74.38	50.10	1:15.0
Common sunflower (*Wyethia mollis*)	60.65	69.46	63.19	61.19	54.41	53.01	1: 3.8
Balsam root sunflower (*Balsamorhiza sagittata*)	66.38	77.28	74.21	74.90	58.69	38.29	1: 3.9
Wild carrot (*Leptotænia multifida*)	68.76	71.10	81.49	83.04	47.39	53.07	1: 9.2
Mountain Indian pink (*Castilleia miniata*) Western variety	66.94	64.76	76.82	80.28	49.05	46.82	1: 8.9
Brome grass (*Bromus marginatus*)	59.79	68.03	15.69	66.91	53.05	42.43	1: 8.5
Native blue grass (*Poa sandbergii*)	52.71	63.90	49.87	60.16	44.68	22.69	1: 8.7
Dandelion (*Crepis intermedia*)	62.30	62.88	33.13	77.45	35.90	48.66	1: 9.5
Bitter brush (*Kunzia tridentata*)	76.86	81.70	71.36	86.10	69.54	57.48	1: 6.9
Bitter vetch (*Lathyrus coriaceus*)[a]	50.38	48.03	32.42	64.55	36.39	28.35	1: 9.4
Little lupine (*Lupinus sellulus*)	68.21	74.78	57.22	75.40	55.71	67.39	1: 4.2

[a] One experiment.

Studies on the metabolism of the domestic fowl on rations of potatoes, rye, and oats, W. VOLTZ (*Landw. Jahrb., 38 (1909), No. 4, pp. 553–592*).—Metabolism experiments lasting usually 5 to 6 days were undertaken with several cockerels about 9 months old. Cooked potatoes, rye, and oats were each fed alone and in mixtures.

In most cases there was either a loss in live weight or it remained stationary, except in some of the rations containing oats. The length of time which the feces remained in the digestive tract varied from 1½ hours in the case of the potato ration to 2½ hours on the grain ration. Because of this short time bacteria can have but little influence in assisting in the work of digestion. That portion of the feces which was retained for some time in the cecum was of different composition from the rest.

One cockerel died after having been kept for 110 days on an exclusive diet of potatoes, and another died after 107 days on an exclusive diet of rye. During that period both lost about 33 per cent in live weight. The conclusion is reached that the minimum daily allowance for fowls is 1 gm. of digestible protein per 1 kg. live weight.

The coefficients of digestibility are given in the following table:

Average coefficients of digestibility, total energy, and percentage of available energy obtained with rations for fowls.

Ration.	Total organic matter.	Protein.	Ether extract.	Nitrogen-free extract.	Fiber.	Total energy in the ration.	Metabolizable energy.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Calories.*	*Per cent.*
Potatoes	78.33	46.94		84.46	0.40	122.79	73.83
Potatoes, rye, starch	77.28	47.98		83.49	6.29	193.17	64.94
Potatoes and oats	82.35	54.48	49.37	92.48	6.74	230.16	77.38
Rye	79.20	63.00	28.50	85.60		187.33	74.20
Oats						233.14	66.84

On cellulose digestion in domestic animals, A. SCHEUNERT (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 5, pp. 113, 114*).—A continuation of work previously noted (E. S. R., 22, p. 474). In 3 series of experiments the author collected the secretion from the salivary glands of sheep and found that in no case was it able to digest cellulose after remaining in the thermostat for several days.

On the digestion of cellulose, G. SEILLIÈRE (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 3, pp. 107-109*).—A report is given of experiments in treating cotton fibers with caustic soda, potash, and other reagents and then digesting with the fluid obtained from the alimentary tract of *Helix pomatia.* The author suggests the possibility of using these reagents for rendering stock feeds more digestible.

Analyses of maize products, E. GUDEMAN (*Abs. in Science, n. ser., 13 (1910), No. 791, p. 308*).—Analyses of maize products during the last 5 years are reported, showing changes in the composition of these products, especially as to ash, acidity, sulphites, arsenic, and metallic impurities. The effect of federal and state food laws on the composition of these products is discussed.

Soy beans, powder, and oil cake, E. COLLIN (*Ann. Falsif., 3 (1910), No. 15, pp. 19-24, figs. 2*).—A description is given of the external, microscopic, and chemical characters of soy beans, powder, and oil cake.

Feeding stuff inspection (*Maine Sta. Off. Insp. 20, pp. 29-36*).—Analyses are reported of cotton-seed meal, cotton-seed feed, linseed meal, gluten feed, distillers' grains, wheat offals, beef scraps, molasses feed, oat feed, alfalfa meal, pea hull meal, and mixed feeds.

Inspection of commercial feed stuffs, P. H. SMITH and J. C. REED (*Massachusetts Sta. Bul. 132, pp. 3-64*).—This bulletin contains analyses of commercial feeding stuffs found on the market during the year 1909, together with comments on the results of the inspection. The special topics discussed are the occurrence of weed seeds in feeding stuffs, the weight of sacked feeds, and complete rations for dairy stock. There is a tabulated list of the wholesale prices of feeding stuffs for the year, and an open letter about low grade by-products, by J. B. Lindsey.

Inspection and analyses of commercial feeding stuffs, W. F. HAND ET AL. (*Mississippi Sta. Bul. 133, pp. 4-31*).—Analyses of commercial feeding stuffs, chiefly wheat and rice by-products and mixed feeds, are reported.

Concentrated feeding stuffs and fertilizers licensed for sale in Wisconsin, 1909, F. W. WOLL (*Wisconsin Sta. Spec. Bul., 1909, Apr., pp. 11*).—This contains a list of manufacturers of concentrated commercial feeding stuffs and commercial fertilizers that have obtained state licenses for their respective brands for the calendar year ended December 31, 1909.

Concentrated feeding stuffs and fertilizers licensed for sale in Wisconsin, 1910, F. W. WOLL (*Wisconsin Sta. Circ. Inform. 11, pp. 12*).—This contains a similar list for the calendar year ending December 31, 1910.

Registered feeding stuffs (*Kansas Sta. Feeding Stuffs Buls. 5, 6, 7, 8, 9, pp. 4 each*).—These monthly bulletins contain the names of the feeds registered in the State from November, 1909, to March, 1910, for the year ending June 30, 1910.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 219-223, pp. 2 each; 228, 229, p. 1 each; 230, 231, pp. 2 each*).—These have to do with the adulteration of milk, misbranding of condensed milk, and the adulteration and misbranding of bran and stock food.

The dairy calf at meal time, D. H. OTIS (*Wisconsin Sta. Bul. 192, pp. 3-14, figs. 4*).—This bulletin contains information for the practical farmer on feeding

calves, based largely on results found at the experiment stations. It is pointed out that by good feed and care, or the lack of it, it is easy to make a variation of $1 to $10 per head in the value of the calf the first year.

Directions are given for using skim milk, buttermilk, whey, and other feeds as substitutes for whole milk.

Raising lambs in Alabama: Maintenance rations for ewes.—Feeding cotton-seed meal to pregnant ewes, D. T. Gray and J. W. Ridgway (*Alabama Col. Sta. Bul. 148, pp. 131–158, pls. 4*).—This contains general information on sheep raising in Alabama and reports experiments in raising lambs begun in the summer of 1906. Details of the method of handling the flock and the winter feeding of ewes are given.

One lot of ewes was kept at uniform weight in the winter of 1906–7 on a ration of 0.5 lb. of cotton-seed meal and 1.3 lbs. of hulls daily. Another lot was maintained on a daily ration of 1.9 lbs. of soy-bean hay. The lot on soy-bean hay ate on an average 1.35 lbs. of salt per head per month, and the lot on cotton-seed meal and hulls 1.53 lbs. A lot fed green sorghum and mixed hay consumed 1.23 lbs. of salt per head per day, and one receiving cotton-seed meal and hulls 1.29 lbs. The water drank per head per day by ewes from August 21 to September 9 on a green sorghum ration was 2.5 lbs., and on cotton-seed meal and hulls, 6.1 lbs. The lambs attained an average of 51 lbs. each at the end of 101 days, and were sold from 8 to 9 cts. per pound live weight.

Sixty-five ewes were fed on cotton-seed meal for different lengths of time, and in varying amounts, with no ill results, except in one case where a ewe that had been fed on a cotton-seed meal ration for 147 days staggered and became blind and finally died. There were no more cases of abortion among ewes eating cotton-seed meal than in the check lots.

Swine: Breeding, feeding, and management, W. Dietrich (*Chicago, 1910, pp. 312, pl. 1, figs. 36*).—In this book an attempt is made "to present the subject of swine breeding, feeding, and management in such a form that it can be understood by the general farmer and swine breeder, the man who is producing hogs for the pork product, as well as for the man who is producing pure-bred swine for breeding purposes. The student also is kept in mind, and it is hoped that the elementary form in which this subject is presented will appeal to the needs of the class room."

The information is drawn to a large extent from the author's practical experience on the farm and from the experimental work which he has conducted at the Illinois Station. The portion of the book which treats of feeding rests on a more scientific basis than is usually the case in so-called practical books.

Swine in health and disease, Zwaenepoel and Hermans (*Les Maladies et l'Hygiène du Porc et son Exploitation Zootechnique, pp. 305, pls. 7, figs. 23; rev. in Ann. Méd. Vét., 58 (1909), No. 6, pp. 367, 368; Rec. Méd. Vét., 86 (1909), No. 23, pp. 846, 847*).—This is a practical treatise upon the breeding, feeding, and management of swine.

Notes on the history of swine raising in Norway, 1660–1814, S. Skappel (*Tidsskr. Norske Landbr., 16 (1909), No. 7, pp. 326–331*).—This is a general discussion of the conditions of the swine industry during the period stated.

Horse breeding in theory and practice, B. von Oettingen (*London, 1909, pp. VIII + 469*).—This book, which is a translation from the German, is largely a discussion of data obtained from stud books of the Thoroughbred horse and from reports of racing trials.

The first part is devoted exclusively to the Thoroughbred, taking up in detail the development of the breed up to the middle of the nineteenth century, a dis-

cussion of points in which the author thinks it has deteriorated since then, and suggestions for its improvement. Parts 2 and 3 treat respectively of heredity and the practical part of horse breeding.

State legislation regulating the standing of stallions and jacks for public service, R. A. CAVE (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 335–344*).—This article contains the text of the Wisconsin stallion law, notes on the stallion laws of other States, and remarks on the beneficial results of this legislation.

Inheritance of characteristics in domestic fowl, C. B. DAVENPORT (*Carnegie Inst. Washington Pub. 121, pp. 100, pls. 12*).—This work reports a series of studies on the question of dominance and its varying potency in poultry and contains a general discussion of the following topics: Relation of heredity and ontogeny; dominance and recessiveness; potency; reversion and the factor hypothesis; the limits of selection; noninheritable characters; and the rôle of hybridization in evolution.

The potency of a character is defined as the capacity of its germinal determiner to complete its entire ontogeny (E. S. R., 22, p. 671).

A complete series of cases is reported which shows the different degrees of potency of common characteristics found in poultry. The split or Y comb, which results from mating a single comb with a V comb as seen in the Polish race, is a heterozygous form due to imperfection of dominance of the median element. It is a case where relative dominance varies from perfection to entire absence and through all intermediate grades, the average condition being a 70 per cent dominance of the median element. When dominance is relatively weak or of only intermediate grade the second generation of hybrids contains extracted pure dominance in the expected proportions of 1:2:1, but as the potency of dominance increases in the parents the proportion of offspring with the dominant (single comb) increases from the 25 per cent to 50 per cent. This leads to the conclusion that on the one hand dominance varies quantitatively and, on the other, that a degree of dominance is inheritable. The index of heredity was found to be 0.301 ± 0.002, which agrees closely with Pearson's theoretical coefficient of correlation between offspring and parent.

The studies on polydactylism revealed a similar variation of potency and showed, in Houdans at least, an inheritance of potency. "There is some evidence, derived from 'pure-bred' Silkies, that differences in the degree of development of the extra-toes are inherited. But the average condition of the toes in the offspring of second or later generation hybrids can not be used as evidence of inheritance of the degree of parental development of the toes, since these are dependent on the same basal cause, namely, the hidden gametic constitution of the parents. Despite the obscuration of imperfect dominance, polydactylism in poultry proves itself to be a unit-character that segregates."

Syndactylism illustrates another step in the series of decreasing potency of the dominant. On not one of the F_1 generation was the dominant (syndactyl) condition observed, and when these hybrids were mated together the dominant character appeared in not 75 per cent but in from 10 per cent to none of the offspring. "The striking fact, the one that assures us the segregation is nevertheless occurring in this case too, is that some families (whose two parents are extracted recessives) throw 100 per cent recessives. . . . Syndactylism is a typical sport, that is, a rather large mutation having a teratological aspect. . . . It is probable that syndactylism, under the conditions of the poultry yard, has little life and death significance, but is one of those neutral characters whose existence Darwin clearly recognized."

The source of diminishing potency is illustrated in the case of rumpless fowl. "Here a dominant condition was originally mistaken for a recessive condition because it never fully showed itself in F_1 and F_2. Nevertheless, in related individuals the condition is fully dominant. We thus get the notion that a factor that normally tends to the development of a character may, although present, fail to develop the character. Dominance is lacking through impotence."

"The last term of the series is seen in the wingless cock which left no wingless offspring in the F_1 and F_2 generations. In comparison with the results gained with the rumpless cock, winglessness in this strain is probably dominant but impotent."

The inheritance of booting, or the feathering on the feet, was studied with bantam Cochins of 2 varieties, a bantam Dark Brahma, and with Silkies. It appeared to be blended and without segregation, but by the aid of the principle of imperfect dominance, the apparent blending was found to follow segregation. Booting was controlled by a dominant inhibiting factor which varies greatly in potency. The coefficient between average parental and filial grades was found to be -0.17 ± 0.13, which can be interpreted to mean that in a homogenous assemblage of families there is no correlation between the grade of booting of parents and offspring. By the aid of the same principle in crosses between the embryonic open condition of the nostril, exhibited by the Polish and Houdan, and the more advanced condition of the narrow nostril, the nostril height was found to be controlled by an inhibiting factor that stops the overgrowth of the nasal flap and produces the narrow nostril.

"The crest of fowl receives especial attention as an example of a character previously regarded as simple but now known to comprise two and probably more factors—a factor for erectness, one for growth, and probably one or more that determine the restriction or extension of the crested area.

"The direction of lop of the single comb is an interesting example of a character that seems to be undetermined by heredity. In this it agrees with numerous right and left handed characters It is not improbable that the character is determined by a complex of causes, so that many independent factors are involved.

"A series of studies is presented on the inheritance of plumage color. It is shown that each type of bird has a gametic formula that is constant for the type and which can be used with success to predict the outcome of particular combinations. New combinations of color and 'reversions' receive an easy explanation by the use of these factors. The cases of blue, spangled, and barred fowl are shown also to contain mottling or spangling factors."

The difficulty of changing a breed is illustrated by 2 experiments. The aim of the first experiment was to increase the red in Dark Brahmas by crossing with Game, but was met with wholly unexpected prompt success, though not in the way anticipated. The result was not due to selection but to the recombination of the factors necessary to make the Game plumage coloration. In the second experiment an attempt to produce a new buff race from the Game fowl by means of selection has so far resulted in failure.

A bibliography of the literature is appended.

Some factors influencing the vigor of incubator chickens, J. H. Stewart and H. Atwood (*West Virginia Sta. Bul. 124, pp. 21–45*).—Experiments are reported on the effect of the age of the parents upon the vigor of chickens, on the airing and cooling of eggs during incubation, and on the use of moisture.

Eight comparative tests were made on the fertility and hatchability of eggs from pullets and old hens. As far as stated, the only breed of fowl used was the White Leghorn. The eggs and chicks were treated as uniformly as possible.

As the following table shows, the eggs of the pullets were smaller, less fertile, the chicks smaller when hatched, the growth slower, and the deaths from disease more numerous than was the case with eggs laid by mature fowls:

Fertility and hatchability of eggs in young and old fowls.

	Number of eggs incubated.	Weight of eggs per 100.	Per cent unfertile.	Number of chicks hatched.	Per cent of eggs hatched.	Weight of chicks per 100.	Weight of chicks per 100 at second weighing.
		Lbs.				Lbs.	Lbs.
Pullets	55	11.50	8	45	81.80	7.33	....
2-year-old hens	79	12.18	9	60	75.90	7.54	....
3-year-old hens	74	14.29	5	60	81.10	8.47	....
Pullets	114	11.71	19	76	66.70	7.64	[a] 24.70
2-year-old hens	92	12.22	15	62	70.50	7.75	27.60
3-year-old hens	88	13.16	9	64	77.10	8.50	35.00
Pullets	71	12.21	18	51	71.80	7.64	....
2-year-old hens	55	12.04	7	46	83.60	7.71	....
3-year-old hens	57	13.07	8	39	68.40	8.00	....
Pullets	104	9.95	28	69	66.99	6.46	[b] 30.74
2-year-old hens	72	13.50	8	86	61.87	9.17	37.32
3-year-old hens	72	13.30	36				
Pullets	110	10.09	20	75	68.18	6.51	[c] 18.35
3-year-old hens	110	13.09	8	91	85.45	8.24	25.17
Pullets	180	10.30	22	127	70.96	6.75	[d] 19.00
Old hens	180	13.04	12	152	85.39	9.15	25.40
Young fowls	60	11.70	23	25	41.66	7.00	22.60
Old hens	60	13.20	9	39	65.00	8.33	26.90
Young fowls	180	12.10	48	123	69.16	7.68	....
Old hens	180	12.50	19	138	80.70	8.24	....

[a] At 40 days after hatching.
[b] At 46 days after hatching.
[c] At 22 days after hatching.
[d] At 21 days after hatching.
[e] At 26 days after hatching.

In a trial with the incubator ventilators open and with an average maximum and minimum outside temperature of 80° and 54.7° F., respectively, a better hatch was obtained and the chicks were stronger when the eggs were not cooled. Like results were obtained in a second trial with closed ventilators and with a low external temperature. In 3 other tests with closed ventilators and a high outside temperature the eggs not cooled hatched better than the cooled eggs in 2 incubators, and not quite so well in one of another make, but the chicks from the cooled eggs were stronger than the others in all 3 hatches. This apparently indicates that in warm weather, when the circulation of air in the incubator tends to become sluggish, it may be advisable to air the eggs for a reasonable length of time.

"It is difficult to conceive of any valid reason for cooling eggs during incubation and thus slowing down the vital processes. . . . The beneficial effects which unquestionably sometimes arise from the process of cooling and airing are due to the airing."

In 8 tests which were made on the influence of moisture during incubation, somewhat more chicks were hatched in the incubators operated without moisture, but this result may have been due to the operator's more extensive experience in the use of the no-moisture machine. The loss in weight of the eggs incubated without added moisture was very nearly normal, while in the case of machines operated with moisture the loss was about two-thirds of the normal. In all cases the chicks hatched in the machine with added moisture were heavier than the chicks hatched without added moisture, and apparently

remained somewhat heavier. The percentage of deaths from all causes in the case of the 2 lots of chickens was exactly the same. Apparently the chick embryo has the power to adapt itself to a considerable extent to varying degrees of humidity during development. Though the chicks with the lower moisture content seemed more vigorous, yet there are certain limits beyond which this would not be true, and the practice recommended is so to incubate eggs that the loss in weight will agree as closely as possible with the normal.

Miscellaneous information concerning the live-stock industry (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 393–427*).—This information includes a review of the live stock market in 1908, meat prices at home and abroad, the foreign trade in animals and animal products, federal meat inspection, and data as to the number of live stock registered in the United States, certified pedigree record associations, national and state stock breeders' associations, legal standards for dairy products, contagious diseases of animals in foreign countries, and a list of state live stock sanitary officers.

The live stock situation in Illinois, H. W. MUMFORD (*Illinois Sta. Circ. 140, pp. 15*).—This is an address before the Illinois Live Stock Breeders' Association, January 27, 1910, in which the author calls attention to the tendency of the present time in the Central West to abandon live stock production. The causes for this are discussed and measures are suggested for the encouragement of the live stock industry.

Notes on the animal industry of Argentina, G. M. ROMMEL (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 315–333, pls. 6, figs. 15*).—This article contains statistics of the live stock industry, descriptions of stock management as practiced on the large Argentine ranches, and an account of the meat packing plants on the River Plate. Among suggestions offered for developing trade with South America are the following: "Only good animals should be sent. Argentine breeders are just as good judges as those in other countries. The best demand exists for beef cattle in the following order: Shorthorns, Herefords, Aberdeen-Angus; for horses, Thoroughbreds and Hackneys; for sheep, Lincolns are by far the most in demand; for hogs, Berkshires and Poland-Chinas, but the hog trade . . . is limited."

The development of live-stock shows and their influence on cattle breeding and feeding, E. G. RITZMAN (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 345–356*).—An account of the development of live-stock shows and their educational value for the feeder and breeder. It is suggested that more detailed information should be obtainable concerning the carcass competitions and the methods of feeding and preparing all animals for exhibition purposes.

The value of the poultry show, R. R. SLOCUM (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 357–363*).—The educational, commercial, and social values of poultry shows are discussed. It is pointed out that the utility side of the industry should be emphasized in the future, as up to the present time purely fancy points have been pushed forward faster than utility qualities.

DAIRY FARMING—DAIRYING.

[Velvet beans for milk production], J. M. SCOTT (*Florida Sta. Bul. 102, pp. 56, 57*).—During the winter of 1908–9 a test of feeds for milk production was made in which velvet beans in the pod, wheat bran, and sorghum silage were compared with cotton-seed meal, wheat bran, and sorghum silage.

It was found that 5,660 lbs. of the velvet beans in the pod, which it is estimated can be grown by the farmer for $16.98, were equal in feeding value to 2,000 lbs. of cotton-seed meal analyzing 7.5 per cent of ammonia and costing $30. Some stockmen reported unfavorable results from feeding the velvet beans, but

it is believed that these may be avoided by feeding in moderate amounts and in combination with other feeds.

Is dairy farming profitable? W. F. SPILLMAN (*Hoard's Dairyman, 41 (1910), No. 11, pp. 404, 405*).—The author presents in tabular form data on 12 types of dairy farms in order to compare the net profit when grain is raised and when it is bought, both for large and small herds. The conclusion is drawn that "at the present time in cases where the income of the cow is less than something like $100 there is more profit in keeping the smaller herd and raising the concentrates than in keeping a larger herd and buying the concentrates, but with herds where the income per cow is $130 or more it will undoubtedly pay under present conditions to keep the larger herd and buy the concentrates."

Cow index of keep and profit, W. J. FRASER (*Illinois Sta. Circ. 134, pp. 22, figs. 2*).—The author has compiled a table in which the various items of income and expenditure from a dairy herd, based on the findings of the department of dairying at the station, are so presented that any dairyman can readily ascertain the profit or loss per year for each cow in his herd, providing the yields of milk and milk fat are known. There is a detailed explanation of the methods by which the estimates were made. Tabulated data of a number of herds are given to illustrate the range of profit and loss from individual cows in a herd.

The individual animal as the unit in profitable dairying, G. A. SMITH (*New York State Sta. Bul. 322, pp. 16*).—This presents cost data from the station herd showing that the productivity of the individual cow is the true basis on which to establish and maintain a herd for an economical milk production. The cost of milk per pound was found to range with different cows in 1906 from 0.48 to 1.34 cts., in 1907 from 0.6 to 1.578 cts., and in 1908 from 0.655 to 1.838 cts.

"The best cow in the herd (the same cow) averaged 10,150 lbs. of 4 per cent milk annually for 3 years on $58 worth of food; the poorest cow (different ones each year) averaged 3,350 lbs. of 5.85 per cent milk on $52.40 worth of food. . . . [In 1908] if for the poorer half of the herd we had substituted animals equal to those in the better half, it would have increased the yearly station revenue $237.40 if we had sold milk at current shippers' prices, or $379.90 if we had sold butter fat, with an added expense of only $40, the cost of the extra food consumed by the better cows."

Data obtained from inquiries sent to dairymen are also presented, which emphasize the importance of weeding out poor cows if a profit is to be obtained at the present high prices of feeds.

Robber cows in dairy herds, F. H. HALL (*New York State Sta. Bul. 322, popular ed., pp. 2–8*).—A popular edition of the above.

A decade of official tests of dairy cows, 1899–1909, F. W. WOLL and R. T. HARRIS (*Wisconsin Sta. Bul. 191, pp. 3–49, figs. 23*).—This is an account of the work of the station in making official tests of dairy cows. The number of tests during the year ended October 1, 1909, aggregated 1,479, an increase of 11 per cent over the previous year. The various breeds represented were as follows: Holstein, 364; Guernsey, 143; Jersey, 28; Red Polled, 7; and grades, 1. Of the Holstein tests, 20 were 2-day tests, 352 7-day tests, and 10 30-day tests. During the last decade these tests have been conducted in 27 counties for 109 breeders, in all a total of 2,764 cows.

It is believed that the system of official and semiofficial testing has been largely responsible for the improved breeding, feeding, and care of dairy stock which has exerted an influence upon the entire dairy industry. During the first 5 years of the decade the average production of aged Holstein cows on

7-day tests was 397.5 lbs. of milk and 13.9 lbs. of butter fat, while in the last 5 years of the decade the average production of this class was 432.9 lbs. of milk and 15.3 lbs. of butter fat.

Community breeders' associations for dairy cattle improvement, G. C. HUMPHREY (*Wisconsin Sta. Bul. 189, pp. 3–21, figs. 7*).—This bulletin discusses the purpose of community organizations for breeders of dairy cattle, the advantages of buying and selling through cooperative advertising, and the method of procedure in forming local organizations, and contains an account of the organizations which have been formed in Wisconsin. The first of these associations in the State was organized in 1906. In January, 1910, there were 31 which were well distributed through the important dairy sections of the State.

Improved methods for the production of market milk by ordinary dairies, C. B. LANE and K. E. PARKS (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 365–377, figs. 11; Circ. 158, pp. 12, figs. 11*).—The topics treated in this article include the care of the herd, handling the milk, the milk house, utensils, and equipment. There are illustrations of a milk house, the interiors of both filthy and sanitary stables, milk pails, and a sterilizer. A device invented by Dr. L. H. P. Maynard, of the Dairy Division of this Department, for milking directly into the shipping can is illustrated and described.

A list of Department publications on the subject is appended.

Economic and sanitary milk production, O. F. HUNZIKER and O. E. REED (*Indiana Sta. Circ. 20, pp. 24, figs. 15*).—Popular information is presented concerning the selection of the dairy cow and sire, milk records, feeding the dairy herd, feeding the calf on skim milk, the care of milk, and the consumer as a factor in producing sanitary milk.

A study of the fatty bodies in milk, V. VINCENT (*Ann. Sci. Agron., 3. ser., 4 (1909), II, No. 4, pp. 278–287*).—These studies refer particularly to the glycerol in milk, cream, and butter.

From the results obtained it is evident that glycerol is present in old butter and cream but not in milk, and that no relation exists between the glycerol content and the free-fatty acids. Lipases are not normally present in milk or cream, and the presence of soap in butter is due to the presence of certain bacteria which secrete lipases. This lipolytic action is not responsible for the formation of butter aroma, the latter being probably due to the cleavage of the lactose. Lactic acid bacteria apparently do not secrete lipases.

Further studies in the acidity of fresh milk, W. M. ESTEN (*Science, n. ser., 31 (1910), No. 797, p. 548*).—An abstract of a paper read before the Society of American Bacteriologists, December, 1909.

The entire range of variation of the acidity of the milk during the year for a herd of 25 cows was from 0.155 to 0.187 per cent. The acidity varied inversely as the temperature, reaching its highest point in February and the lowest in August. "The quality of the milk varies as the acidity, so that the winter milk has more food value than in summer and a higher price in winter is justified by this fact. The acidity has an important bearing in the inspection of milk. The dairy selling Jersey milk with 5 per cent of butter fat will sometimes show an acidity of 0.2 per cent when fresh and does not then contain a particle of lactic acid." "It is therefore requisite that milk inspectors be capable of judging a high acid content of milk which indicates high quality and value from high acidity caused by growth of acid organisms."

The determination of the number of leucocytes in milk by a direct method, S. C. PRESCOTT and R. S. BREED (*Science, n. ser., 31 (1910), No. 797, p. 552*).—An abstract of a paper read before the Society of American Bacteriologists, December, 1909.

By the use of a new method, described by the authors, it has been found that the distribution of the leucocytes after centrifuging, varied greatly in different milks, although it was approximately the same in different samples of the same milk. Usually more than half of the total number are present in the cream, one-fourth or less in the precipitated slime, and the remainder in the skim milk. A series of tests showed that a much larger number of leucocytes were normally present than has been supposed. The average number present in the samples examined was approximately 1,500,000 per cubic centimeter.

The influence of meteorological factors on the constituents of milk of Siberian cows, J. Jefremov and A. A. Kalantar (*Trudui Selsk. Khoz. Met., 1909, No. 5, I, pp. 36–43*).—Observations are described which, in the opinion of Jefremov, seem to indicate the direct influence of the meteorological factors on the composition of the milk. According to this author, a dry and hot summer will give a milk with a higher fat content than a cold and wet summer.

Kalantar questions the correctness of the interpretation of most of the observations by Jefremov and qualifiedly admits a connection between the temperature and the quality of the milk in only two cases.

The influence of yohimbine on milk production in cows and sheep, Kronacher (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 11, pp. 245–248, charts 3*).—In experiments with 6 cows and 2 sheep previous experiences with yohimbine were confirmed. It increased the flow of milk, yet its effect was more or less temporary and it can not be recommended as a galactogogue during the early period of pregnancy. It can be used, however, for treating cases of metritis and as an aphrodisiac.

The dissemination of disease by dairy products, and methods for prevention (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 153, pp. 57, figs. 11*).—This circular consists of the following papers, which contain important summaries of information which all producers and consumers of dairy products should know, concerning the dangers of contaminated milk and the methods by which they can be avoided and overcome: Milk as a Carrier of Contagious Disease, and the Desirability of Pasteurization, by G. L. Magruder (pp. 7–27); The Importance of a Wholesome Milk Supply, by J. R. Mohler (pp. 28–37); The Relation of the Tuberculous Cow to Public Health, by E. C. Schroeder (pp. 38–45); Interpretation of Results of Bacteriological Examination of Milk, by L. A. Rogers and S. H. Ayers (pp. 46–52); and Pasteurization, its Advantages and Disadvantages, by M. J. Rosenau (pp. 53–57).

In these papers emphasis is laid on the need of better understanding by producers and the public of the importance of a more wholesome and sanitary milk supply, the necessity of legislation and competent official supervision, the proper handling of milk by producers, merchants, and in the home, and the advantages of pasteurization in cases where there is any doubt of the healthiness of the milk.

Report to the local government board on investigations in the public health laboratory of the University of Manchester upon the prevalence and sources of tubercle bacilli in cow's milk, A. S. Delepine (*Ann. Rpt. Local Govt. Bd.* [*Gt. Brit.*], *38 (1908–9), pp. 341–414, figs. 11, dgms. 4, charts 6*).—This is a report of numerous experiments on the presence of tubercle bacilli in milk carried out between the years 1892 and 1908. The most important work done was the examination of 7,000 samples of milk and an inspection of many farms in order to study the sources of infection of the milk supply of Manchester, England. Data on farms visited are presented in tabular form. There are also charts showing the distribution of the milk supply in that vicinity.

Some of the conclusions reached are as follows: "Lesions of the udder were found in one or more of the cows on at least three-fourths of the farms supplying tuberculous milk to Manchester. . . .

"Tuberculosis of the udder can be detected with great accuracy by a combination of veterinary inspection of the cows and of bacteriological examination of the milk obtained from udders showing signs of disease, more specially enlargement and induration. It is unfortunately impossible for the most experienced veterinary surgeon to distinguish, by inspection and palpation, tuberculous mastitis from all other forms of mastitis. It is also practically impossible of the veterinary surgeon, unaided, to discover by ordinary inspection early tuberculous lesions of the udder. The Manchester records show that out of 940 udders which veterinary surgeons of exceptional experience and ability thought might possibly be affected with tuberculosis, only 242 were proved by bacteriological examination actually to be tuberculous. . . .

"One of the facts brought out by the work done in Manchester requires some consideration. Some farmers who supplied tuberculous milk to Manchester have, after this had been discovered, ceased sending their milk to the town, and now send it elsewhere or use it to make cheese. Occurrences of this kind indicate the necessity of strict control of the milk supply of every district. So long as the presence of tuberculous cows, and more specially of aged tuberculous cows, is tolerated in our herds, a certain amount of tuberculous infection of the milk supply is inevitable. The elimination of cows with tuberculous udders undoubtedly removes the most material and dangerous source of infection, but it is only after the milk has become infectious that these cows are detected. Frequent inspection is therefore indicated under the present system of control."

The vitality of typhoid bacilli in milk and butter, H. J. WASHBURN (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 297–300*).—By tracing the causes of typhoid cases occurring in the District of Columbia it was found that 11 per cent in the year 1906 owed their origin to infected milk; in 1907 about 9 per cent and in 1908 about 10 per cent were due to the same cause. Experiments are reported which show that typhoid bacilli will retain their vitality in butter for 151 days. In milk they all disappeared at the end of 43 days.

The economic and sanitary supervision of city milk supplies, M. N. BAKER (*Bur. of the Census [U. S.], Spec. Rpts., Statis. of Cities 1907, pp. 36–45, 449–451*).—This report contains information regarding the milk ordinances of 158 cities in the United States during the year 1907.

Aluminum milk cans, J. H. MONRAD (*N. Y. Produce Rev. and Amer. Cream., 29 (1910), No. 20, p. 740, figs. 2*).—A description and discussion of a nonrusting milk can recently put on the market in Denmark, made from aluminum plates welded together by a patented process and inserted into the lower part of a jacket made of galvanized steel plate. The price is about double that of a tinned steel can.

More about paper bottles, L. B. ALLYN (*Milk Man, 3 (1910), No. 1, p. 9*).—Several tests are reported in which single-service paper milk bottles were compared with glass bottles. Milk kept in glass bottles at a temperature of 65° F. was found to increase in acidity faster than that in paper bottles kept at the same temperature. Samples of market milk kept at different temperatures gave the following results as to the increase of bacteria:

Increase of bacteria in glass and in paper bottles at different temperatures.

Number of sample.	Temperature, degrees F.	Original number of bacteria per cubic centimeter.	Bacteria per cubic centimeter in glass bottles after 10 hours.	Bacteria per cubic centimeter in paper bottles after 10 hours.
1	90	20,250	76,057,050	54,116,200
2	70	44,460	4,446,000	2,712,060
3	50	28,860	132,866	58,320

Milk vinegar, G. Filaudeau and Vitoux (*Ann. Falsif., 2 (1909), No. 8, pp. 278–280; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 1, p. 43*).—The milk residues from butter and cheese factories, which contained on the average 30 to 50 gm. of lactose per liter, were concentrated, primed with sugar, fermented, and the liquor converted into vinegar by the Orleans method. The product obtained was of a clear, bright yellow color and had a pleasant taste.

VETERINARY MEDICINE.

The effect of smelter fumes upon the live-stock industry in the Northwest, R. J. Formad (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 237–268, pl. 1, figs. 7*).—The effects of smelter fumes on the live-stock industry and on forage, as previously noted from other sources (E. S. R., 20, pp. 28, 790) are briefly reviewed and investigations reported.

In response to appeals from stock growers and farmers who had sustained losses of stock and crops, the author conducted investigations from October to December, 1906, in the Deer Lodge Valley, Montana, at distances on an air line of from 1½ to 12 miles from the Anaconda smelter. Information obtained as to the holdings of 49 persons indicated that losses had caused a decrease from 2,447 horses, kept in 1902, to 423.

An experiment made to test the effect of arsenic on horses in which 20 grains of white arsenic was fed to a horse on August 29 and 40 grains the following day resulted in the death of the animal on September 6. Arsenic ulcers similar to those found among horses in the vicinity of the smelter were produced through the application of an arsenical paste of semiliquid consistency to the nasal septum by means of a swab of cotton. The clinical symptoms shown by cattle and horses in the Deer Lodge Valley are described at some length. Post-mortem examinations made of 22 cases are briefly reported as are the microscopical-anatomical studies of samples taken at the autopsies of 12 cases.

"The pathologic findings on post-mortem examination show unmistakable lesions of chronic catarrhal inflammation of the stomach, intestines, lungs, and kidneys. The microscopic preparations demonstrate conclusively the presence of a pronounced irritant, which has operated on all organs pertaining to the metabolism and assimilation of food, as well as those concerned in the elimination of waste products, being characterized by an inflammatory cell proliferation in the mucous membrane of the stomach and intestines, the portal areas of the liver, the peri-bronchial connective tissue of the lung, and the interstitial connective tissue of the kidneys. These cell infiltrations of proliferations can be the result only of an irritant, which on chemical analysis has proven to be arsenic."

A bibliography of the more important literature relating to the subject is appended.

[Report of veterinary division], M. H. Reynolds (*Minnesota Sta. Rpt. 1908, pp. XVI–XXI*).—In this report brief mention is made of the work of the year on ventilation and with hog cholera, swamp fever, tuberculosis, and infectious abortion. The use of hog-cholera serum on normal hogs is stated to have given exceedingly satisfactory results. Experiments have shown that the common laboratory animals are not susceptible to swamp fever.

[Report of department of veterinary science and bacteriology, 1908], W. B. Mack (*Nevada Sta. Bul. 66, pp. 53–62, 65–68, pls. 2*).—During the year under report several chickens from Reno were examined and found to be affected with tuberculosis. A flock of sheep inspected was found to be infected with foot-

rot, a bacillus corresponding morphologically to *Bacillus necrophorus* being discovered. Clinical observations and the results of post-mortem and bacteriological examinations of several cases thought to be hog cholera, and an outbreak of anemia in horses in Elko County previously noted (E. S. R., 21, p. 584), are also reported upon.

Infectious anemia, mycotic lymphangitis, and chronic bacterial dysentery, J. R. MOHLER (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 223–236, figs. 6*).—This article has been substantially noted from another source (E. S. R., 20, p. 785).

The 1908 outbreak of foot-and-mouth disease in the United States, A. D. MELVIN (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 379–392, figs. 8*).—This is an account of the outbreak of foot-and-mouth disease in this country, which was first discovered near Danville, Pa., early in November, 1908, and of the methods and expense of eradication.

Diseased animals were found on 157 premises, of which 101 were in 15 counties of Pennsylvania, 45 in 5 counties in New York, 9 in 2 counties in Michigan, and 2 in 1 county in Maryland. In the work of eradication, 2,025 cattle valued at $76,785.39, 1,329 hogs valued at $11,470.79, 275 sheep valued at $1,759, and 7 goats valued at $18, were slaughtered. The total expenditure by this Department was $299,112.10, and about $113,000 was expended by the four affected States in their part of the work.

As described in a circular previously noted (E. S. R., 21, p. 383) the infection was brought into this country in smallpox vaccine.

The fixation of the complement in glanders, MIESSNER and TRAPP (*Centbl. Bakt. [etc.], 1. Abt., Orig., 52 (1909), No. 1, pp. 115–146, charts 5; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 1, p. 87*).—The authors describe the complement fixation methods, the antigen, the serum, the amboceptor, the complement, and the blood corpuscles, and give details with respect to mallein experiments.

Complement fixation was positive in 95.7 per cent of glandered, and in 1.27 per cent of normal, horses. A suitable antigen was found in an aqueous extract of glanders bacilli made from an agar culture, diluted from 250 to 1,000 times with phenol saline. The antigens were very sensitive to daylight, but bore boiling and minus temperatures of from 10 to 15° C. With aqueous extracts of organs of glandered and normal horses and guinea pigs, there was no complement fixation with the serum of glandered horses. Similar results were obtained when alcoholic extracts were used, and also with oleate of sodium, oleic acid, and lecithin.

The diagnosis of rabies in inoculated animals, J. W. CORNWALL and M. KESAVA PAI (*Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 149–155, charts 2*).—This account is taken from Bulletin 1 of the Pasteur Institute of southern India.

The measure of immunity against rabies in animals, J. W. CORNWALL and M. KESAVA PAI (*Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 156–161*).—An account also taken from Bulletin 1 of the Pasteur Institute of southern India.

Negri bodies, J. W. CORNWALL and M. KESAVA PAI (*Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 162–180*).—Studies from the Pasteur Institute of southern India.

The transmission of avian tuberculosis to mammals, J. R. MOHLER and H. J. WASHBURN (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 165–176*).—An outbreak of tuberculosis among fowls on a large ranch in Oregon that seemed to extend to the swine of the same farm through feeding the hogs upon the carcasses of fowls that succumbed to the disease, led to the inaugura-

tion of a series of experiments designed to ascertain if the bacilli of avian tuberculosis may be transmitted to mammals under suitable conditions.

Two living hens obtained from the infected ranch produced tuberculosis in tuberculin-tested pigs to which they were fed. Affected tissues from these infected pigs were fed to healthy fowls and administered in various ways to guinea pigs and rabbits in order to test their virulence for mammalia. Cultures obtained from these inoculations proved to be avian in their biological characteristics.

Only 2 eggs were laid by the diseased hens during the 5 months following their arrival at the laboratory, which fact is considered to have been due to the unthrifty condition of the birds. "Microscopic examination of these eggs failed to disclose the presence of tubercle bacilli, but the inoculation of guinea pigs proved their presence. Several guinea pigs were inoculated with the white of the egg and others with the yolk. Those which received inoculations of the yolk failed to develop tuberculosis, but those which were injected with the white, with one exception, developed very characteristic lesions within a short period."

Through these and other experiments with avian tubercle bacilli, it has been proved that the micro-organisms of naturally acquired tuberculosis in fowls can be made to lodge and multiply within the tissues of swine, cats, rabbits, and guinea pigs. "Repeated passage of such avian tubercle bacilli in large numbers from animal to animal will result in the final development of a type of tubercle bacilli which will produce typical lesions of tuberculosis in mammals."

The causation and character of animal tuberculosis, and federal measures for its repression, J. R. MOHLER (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 155–164*).—This is a paper that was presented at the annual convention of the American Veterinary Medical Association in 1908 in which the various methods of tuberculous infection, a comparative study of tubercle bacilli, relation to public health, prevalence, and the federal work in suppressing the disease are considered.

The economic importance of tuberculosis of food-producing animals, A. D. MELVIN (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 97–107*).—Previously noted from other sources (E. S. R., 21, p. 282; 22, p. 387).

The relation of the tuberculous cow to public health, E. C. SCHROEDER (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 109–153, pls. 3, figs. 15*).—The subject is reviewed at some length, evidence gained through experimental investigation being presented. The author discusses the character of tuberculosis as a disease of cattle, the manner in which tubercle bacilli are expelled by tuberculous cattle, the appearance of cattle that expel tubercle bacilli, the manner in which tubercle bacilli thus expelled get into milk and dairy products, the virulence and vitality of tubercle bacilli in dairy products, proportion of tuberculous cows among those in use for dairy purposes and the frequency with which dairy products contain tubercle bacilli.

Chronic bacterial dysentery of cattle, J. R. MOHLER (*U. S. Dept. Agr., Bur. Anim. Indus., Circ. 156, pp. 3, fig. 1*).—A reprint of another portion of the paper in the annual report of the bureau above noted.

The morphology of the microbe of bovine pleuro-pneumonia, BORDET (*Abs. in Rev. Gén. Méd. Vét., 15 (1910), No. 174, pp. 348, 349; Vet. Rec., 22 (1910), No. 1124, p. 490*).—The author finds the organisms first discovered in 1908 by Nocard and Roux to be involution forms dependent upon the nature of the culture media. "By special cultural methods, he has succeeded in including these minute particles to develop into typical spirochætæ, stainable by Giemsa's

stain, which he regards as the perfect form of the causal agent of pleuropneumonia."

Spiroptera reticulata in cattle, S. Dodd (*Vet. Rec., 22 (1910), No. 1129, pp. 570, 571*).—Although recently published works upon parasites of domesticated animals state that *S. reticulata* is not known to occur in animals other than equines, the author points out that for some years parasitic nodules containing worms supposed to be this species have been known to exist in cattle in Australia. The parasite in question is very common in Queensland cattle but appears to be seen most frequently in cattle from the western plains.

Report on experiments with the wild passion-flower vine in connection with the death of cattle in the Beaudesert district, S. Dodd (*Queensland Agr. Jour., 24 (1910), No. 2, pp. 88–93*).—Feeding experiments with *Passiflora alba* are reported.

Lip-and-leg ulceration of sheep (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 160, pp. 35, figs. 7*).—This consists of two papers, presented at the convention of the National Wool Growers' Association. Ogden, Utah, January 8, 1910.

I. *The work of the Bureau of Animal Industry for the suppression of lip-and-leg ulceration of sheep,* A. D. Melvin (pp. 5–12).—A group of diseases of an ulcerative nature, variously known as foot-rot, necrotic dermatitis, necrotic stomatitis, etc., which have existed in the United States for many years, have been found to be caused by the necrosis bacillus (*B. necrophorus*), and thus may be considered as a single disease, manifesting itself in various forms. In this paper the author discusses the occurrence of the disease and the work of suppression that is being carried on by this Department. As the malignant form continued to spread, a federal quarantine on sheep in 8 counties in Wyoming was declared August 6, 1909.

II. *Lip-and-leg ulceration (Necrobacillosis) of sheep: Its cause and treatment,* J. R. Mohler (pp. 13–35).—In this paper the author discusses the history of the disease, its nature, and methods of treatment at some length. While it has been discovered in this country in both East and West as well as in various parts of Europe off and on for the past 20 years, until quite recently but little effort has been made to find the causative agent or to check its spread.

"The characteristic lesions may be found on any part of the exterior of sheep where the bacillus which causes it may gain entrance; but cuts, bruises, abrasions, and exposure to devitalizing processes being less frequent upon parts covered with wool and their contact with infection less likely, the woolly portions of the body are less subject to lesions than other parts. In this country lesions upon the head, as lips, chin, nose, cheeks, gums, and hard palate, are the most frequent, while much less common are the ulcers on the legs and feet. Shear cuts and the tail stump of docked lambs are at times infected, while slit ears have been more frequently involved. In bucks frequently and in wethers occasionally the sheath is infected. The vulva of ewes has been found ulcerated in a relatively small percentage of cases, while the udder and teats even more rarely have developed the infection, notwithstanding that the sucking lambs showed more or less ulceration and eruptions on the mouth parts. In some cases lesions have appeared in the pharnyx and lungs, accasionally in the liver and stomach, and in such instances the disease uniformly results in death."

The various manifestations are arranged and described under (1) the lip and leg form, (2) the venereal form, (3) the foot-rot form, and (4) the sore mouth form. The disease is primarily the result of abrasions of the skin and other tissues, allowing the access of the bacilli. A prolonged drought, which renders the food scarce, inducing the sheep to browse on thistles and roughage and thereby causing the necessary abrasions, is a predisposing factor. Experiments conducted by the Bureau of Animal Industry have shown that necrosis

bacilli obtained from lesions of lip-and-leg ulceration will produce similar ulcers in hogs, horses, calves, and chickens which have been artificially infected by them.

"The losses have varied considerably in the different States and sections. One company lost 3,000, or 10 per cent, in 1909; another lost 700 out of 2,000 old sheep, besides a shrinkage in the lamb crop due to abortion; while still another flock master placed his loss at $15,000 from the effects of the disease. Bucks, more valuable in proportion to numbers, are lost to service or become the greatest menace to uninfected bands."

"If taken in time, the disease in the vast majority of cases responds readily to treatment, the principal requisite being vigilance on the part of the herder to cut out as soon as they occur all cases of the infection, which should be placed in the hospital band for hand treatment.

"Prevention should be carried out along three lines: (1) Separation of the sick from the healthy animals; (2) close scrutiny of the sheep that have been exposed to infection by contact with affected animals or premises, or otherwise; (3) complete disinfection of all pens, corrals, and sheds, as the necrosis bacilli will retain their virulence under favorable conditions in and around the sheepfold for several years. The walls, racks, and troughs should be sprinkled with a 5 per cent solution of sheep dip or other similar disinfectant. The manure and a portion of the surface soil of the corral should be removed and the ground sprinkled with the disinfectant solution. If possible, the healthy sheep should be taken to new and uninfected bed grounds and pastured on uninfected range. Experience has shown that sound sheep may be safely pastured on land that has been previously occupied by animals suffering from lip-and-leg ulceration if a winter's frosts have been allowed to intervene."

The treatment of these affections, no matter how many varieties of the disease may make their appearance, consists of disinfection and cleanliness, or disinfection and prevention. Treatment by local antiseptics is very satisfactory if begun in time and applied energetically.

Some important facts in the life history of the gid parasite and their bearing on the prevention of the disease, M. C. Hall (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 159, pp. 7*).—In view of the doubt harbored by veterinarians and sheepmen regarding the correctness of the generally accepted life history of the gid parasite, the subject is here briefly reviewed.

It is shown that the larvæ or bladder form of the dog tænia develops only in the brain and spinal cord of sheep and that ordinarily it is necessary that the larvæ be consumed by a dog for further development to take place. It is suggested as quite probable, however, that further investigations may show that coyotes, other wolves, and foxes, animals closely related to the dog, also serve as hosts for the adult form of this parasite. The author considers it highly improbable that the gid parasite should develop in the sheep outside of the central nervous system to the point where it would be capable of infecting the dog and not have been discovered by helminthologists. Experiments are reported which show that dogs readily gain access to the sheep brain even though protected by the skull.

Gid found in sheep in New York, W. J. Taylor and W. H. Boynton (*Amer. Vet. Rev., 36 (1910), No. 5, pp. 537–548, figs. 7*).—An outbreak of gid in a flock of sheep near Geneva, N. Y., is here reported.

The affected animals were found to be the offspring of Shropshire sheep imported from Great Britain in 1907 and 1908. Two Scotch collie dogs were imported at the same time for use as sheep dogs. In a four months' old lamb examined three cysts of *Tænia marginata* (*Cysticercus tenuicollis*) were found

in the omentum covering the wall of the second stomach, six or seven *Hæmonchus* (*Strongylus*) *contortus* and a whipworm (*Trichocephalus affinis*) were found in the abomasum, and a few larvæ of *Œstrus ovis* in the frontal sinuses. A tapeworm (*Tænia cœnurus*) developed in a dog to which an infested brain was fed.

The prevention of losses among sheep from stomach worms (*Hæmonchus contortus*), B. H. RANSOM (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 269–278; Circ. 157, pp. 10*).—The behavior, life history and means of control of these parasites as brought out by investigation and experiment are discussed.

The older sheep as well as the lambs are more or less heavily infested with stomach worms, but due to a greater resistance are not so much affected. The injurious action of stomach worms is attributed to two things: First, the loss of blood abstracted by the parasites and the loss of nutritive materials which may be absorbed by the parasites from the alimentary fluids, and, second, the destruction of red corpuscles by a poisonous substance secreted by the parasites which is absorbed into the blood. It is suggested that a substance may be present in the blood of adult sheep tending to neutralize the poisonous matter produced by parasites, which is absent from the blood of lambs, or if present occurs in small quantities.

While the maximum longevity of the larvæ is not definitely known, pastures have been found to remain infectious after a lapse of nearly 8 months, namely from October 25 to June 16. Cultures made on September 14, 1906, from the feces of infected sheep and kept in the laboratory contained live larvæ on June 5, 1907. "Cultures in which the embryos were allowed to develop to the final larval stage, after which they were kept in cold storage at temperatures below freezing, in some cases as low as 12° F., still contained some living embryos after two or three months, while in other cultures eggs and embryos not yet developed to the final larval stage were killed within a few hours when exposed to temperatures below freezing." Experiments have shown that the embryonic stomach worms, when contained in liquids, pass through ordinary filter paper.

It is stated that the only method of handling lambs born of infested ewes which can be guarantied to keep the lambs free from stomach worms is so impracticable that it is not likely to come into general use. Experiments made in the District of Columbia in 1908 demonstrated the fact that during the summer lambs can not be entirely protected from infection if kept with infested ewes, even though the flock be placed on fresh pastures at intervals much shorter than would be possible under practical conditions. The plan of having a special suckling pen has also failed to prevent entirely stomach worm infection in lambs from infested mothers. The failure of the method is considered as due to the more or less common occurrence of larval stomach worms upon the skin and wool of the ewes from whence they may sometimes be taken into the mouth of the lambs while suckling and be swallowed.

A plan for the combination of pasture rotation and medicinal treatment is described which it is thought should prevent all losses after the first year or two in operation. In following this plan, all the sheep except the lambs should be given a preliminary treatment with bluestone, coal-tar creosote, or gasoline as directed in the circular previously noted (E. S. R., 18, p. 987). Rotation should then be practised as follows: "Pasture No. 1 until July, pasture No. 2 until winter begins, then to pasture No. 3 (the winter pasture), then at the end of winter to pasture No. 4, then in July to pasture No. 1, then to the winter pasture (No. 3), then to pasture No. 2, etc." If placed upon an infected pasture, a second medicinal treatment should be administered during the summer. Before moving to pasture No. 3, another treatment for stomach worms is recommended. After the first year's treatment the medicine is given only in

the fall, just before the sheep and cattle are moved to the pasture in which they spend the winter.

As salt acts to a certain extent as a preventtive against stomach worms as well as being a necessary element in the diet of ruminants, it should be supplied to the sheep in liberal quantities. It is said that in an experiment in which sheep were fed tobacco no effect was noticeable either upon the stomach worms or upon the sheep.

Malta fever and the Maltese goat importation, J. R. MOHLER and G. H. HART (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 279–295, pl. 1, figs. 3*).—In this paper the authors describe the characteristics of the Maltese goat and the nature of Malta fever, a disease of goats due to *Micrococcus melitensis*, which is conveyed to man through the milk.

The history of the importation of Maltese goats to the United States, made in 1905, and investigations, in which *M. melitensis* was fed to the goats and agglutination tests made of their blood upon their arrival in this country, during the course of which it was shown that the herd was infected, are considered at some length. This infection made the destruction of the entire herd necessary, and all were destroyed within about a year after their importation. It is concluded that "so long as Malta fever remains so prevalent in the Island of Malta, and such a large percentage of the native goats are passive carriers of the *M. melitensis* it will be impracticable to attempt to introduce these animals into the United States. Even if they were assuredly free from *M. melitensis*, it is doubtful on account of climatic conditions whether they could be profitably bred in this country, except in the extreme Southern States."

Field tests with serum for the prevention of hog cholera, W. B. NILES (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 177–217, fig. 1*).—Experiments conducted in 47 herds in order to determine what could be accomplished by treating animals of different ages, located in different localities, and kept under varying field conditions, are here reported.

The results have led the author to conclude that nonimmune hogs of all ages may be protected against hog cholera when sufficient doses of serum are administered, namely, for sucking pigs, from 10 to 15 cc., for shotes weighing from 30 to 200 lbs., from 20 to 30 cc., and for old hogs, from 40 to 60 cc. It is thought probable that further experiments will show that as large a dose as 60 cc. will never be required.

"In herds recently infected with hog cholera where only a few animals have become sick, nearly all loss may be prevented by the use of serum alone. The serum will not save those animals in the last stages of the period of incubation, but may be depended on to protect all of the uninfected animals and most of those in the early stages of the period of incubation. Simultaneous treatment in these herds appears to yield the same results as the serum when given alone except that the duration of immunity may be longer. In badly infected herds, where the disease has made considerable headway, a number of the animals may be saved by the serum, the percentage saved depending upon the extent of the infection; that is, upon the number of unaffected or only slightly affected animals in the herd at the time of treatment. By the prompt use of hyperimmune serum in an infected herd and the prompt vaccination of surrounding herds, hog cholera may be quickly stamped out when it first appears in new territory. In case the infection has already spread from one infected herd to several neighboring herds, the vaccination of all herds bordering on the infected area will prevent further spread of the disease. The treatment of healthy shotes by the simultaneous methods very rarely causes the appearance of disease, and should it do so it may be quickly controlled by the subsequent use of hyperimmune serum alone."

The control of hog cholera by serum immunization, A. D. MELVIN (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 219–224*).—This paper has been previously noted from another source (E. S. R., 20, p. 881).

Mycotic lymphangitis of horses, J. R. MOHLER (*U. S. Dept. Agr., Bur. Anim. Indus., Circ. 155, pp. 5, figs. 4*).—This is a reprint of a portion of the article noted above.

Sporadic Stomatitis pustulosa in horses, BOCHBERG (*Ztschr. Veterinärk., 21 (1909), No. 5, pp. 220, 221; Vet. Jour., 65 (1909), No. 408, pp. 317, 318*).—A report of the disease in 5 horses. It is supposed to have arisen from the use of moldy and dusty clover hay.

A case of periodic ophthalmia, WALTHER (*Abs. in Vet. Rec., 22 (1910), No. 1128, pp. 554, 555*).—A case regarded as a metastatic sequel of periodic ophthalmia is reported.

Gout in birds (*Abs. in Vet. Rec., 22 (1910), No. 1129, pp. 573, 574*).—Avian gout like human gout is said to assume articular and visceral forms.

Notes on some diseases of the ostrich, W. ROBERTSON (*Agr. Jour. Cape Good Hope, 36 (1910), No. 1, pp. 34–41, figs. 4*).—Notes are given on anthrax, or miltziekte, and paralysis of the limbs due to a short bacillus. This latter affection is said to have been on the increase during the past 6 years.

Note on an intestinal parasite of the ostrich, W. JOWETT (*Agr. Jour. Cape Good Hope, 36 (1910), No. 1, pp. 60–63, figs. 6*).—The parasite described appears to be a Strongylus (Sclerostoma).

The occurrence of bacteria in Echinococci and Cysticerci and their relation to the death of these animal parasites, R. MEIHLHOSE (*Centbl. Bakt. [etc.], 1. Abt., Orig., 52 (1909), No. 1, pp. 43–74, pl. 1, fig. 1*).—The results of a study of the bacterial contents of the bladder forms of tapeworms are reported in tabular form, 60 cases being thus presented.

Bacillus arenicolæ n. sp., a pathogenic bacterium from the gut-epithelium of Arenicola ecaudata, H. B. FANTHAM and ANNIE PORTER (*Centbl. Bakt. [etc.] 1. Abt., Orig., 52 (1909), No. 3, pp. 329–334, pl. 1*).—This new species, found by the authors in the lumen of the gut and within the intestinal epithelium of *A. ecaudata*, though not of frequent occurrence, causes lesions in the gut-epithelium of the annelid and may hasten its death.

RURAL ECONOMICS.

The agricultural laborer, L. THOMASSIN (*Bul. Soc. Agr. France, 1910, Apr. 1, pp. 20–26*).—This is a paper read before the Agricultural Society of France, February 23, 1910.

The author made a study of the economic and social conditions surrounding the life of farm laborers in the Vexin district, with a view of determining the chief causes of rural depopulation and of suggesting means for the repopulation of the land. As far as wages are concerned, the farm laborers in this section of France are shown to receive from 85 to 120 francs per month without board, from 50 to 70 francs per month with board, and other premiums according to the amount of milk produced, sheep sold, lambs raised, and wool produced. Day laborers receive 3 francs per day without board and 2 francs with board. The economic position of farm laborers, therefore, is regarded as comparing favorably with the lot of industrial workers.

The social position of the farm laborer, however, is regarded as capable of great improvement and as the chief cause of rural depopulation. To improve conditions it is recommended that good houses should be erected with attached gardens, that facilities be afforded for keeping poultry, pigs, rabbits, etc., to

help defray the cost of living, and that laborers should be permitted to enjoy Sunday as free as possible from all kinds of labor. Such social advantages, it is believed, would result in the establishment of farm laborers' households with their attendant joys of family life and would serve as a means of retaining laborers on the land.

The chief recommendation, however, is the erection on each large farm of a hall where the workmen and their families could meet in social gatherings, where lectures could be given and entertainments held, and with a library of good books and other educational features provided which would take the place of the attractions of the cities. In these features the woman on the farm could play a large social rôle, as could also the proprietor to whom, particularly, it would be a matter of economic interest to promote the social welfare of both farmers and tenants.

The farm at Trousse and the laborers' dwellings, II. HITIER (*Jour. Agr. Prat., n. ser., 19 (1910), Nos. 2, pp. 49–53, figs. 3; 3, pp. 83–86, figs. 7*).—This article describes the arrangement and operation of a farm of 675 acres, the proprietor of which received the gold medal awarded by the Agricultural Society of Meaux for the amelioration of agricultural conditions.

The special feature on this farm which led to the reward was the erection of laborers' houses, well lighted, sanitary, commodious, and with attached gardens which were constructed and arranged by the proprietor with the desire of actually improving the conditions of the agricultural laborers employed on his estate. The plans of these houses and their interior and exterior arrangement and surroundings are described and illustrated. It is urged that the example set by the proprietor of this farm should be emulated by large farmers as a means of raising the standard of living of farm laborers and their families.

Concerning the establishments for migratory laborers (*Württemb. Wchnbl. Landw., 1910, No. 10, pp. 159, 160*).—Statistics are presented on the successful operation for the three months ended December 31, 1909, of the 27 places established in Württemberg for the registration and care of agricultural and other laborers in search of employment. The returns show a decrease in begging and of offenses punishable by imprisonment as a result of the establishment of these institutions.

The winter work of the farmer (*Landw. Ztschr. Rheinprovinz, 10 (1909), No. 49, pp. 702, 703*).—This article discusses the different lines of work which farmers can do in winter, such as the care of tools, machinery, buildings, fences, manure, soil, woodlands, orchards, etc., the keeping of farm accounts and their value, attendance at meetings of farmers, and the reading of agricultural literature. Such work, it is believed, would give the farmer a better insight into the economic status of his farm operations and result in more profitable systems of farm management.

Working methods in American agriculture, J. SUNDBY (*Tidsskr. Norske Landbr., 16 (1909), Nos. 9, pp. 387–419; 11, pp. 498–536*).—A report on observations made by the author during a visit to the United States in 1908.

The agrarian situation and agriculture in Belgium, J. FROST (*Agrarverfassung und Landwirtschaft in Belgien. Berlin, 1909, pp. VIII+555, maps 2*).—This volume discusses the climate and soils of Belgium, the means of transportation, the condition of the agricultural population, agricultural organizations, and education, with detailed accounts of the systems of farming practiced in the different sections of the country and the nature and extent of the agricultural industries, including data as to both the kind and quantity of crops raised and the live stock industries.

Belgium is shown to be a nation of small holdings. In 1905 out of a total of 286,250 farms, no less than 193,845 were from 1 to 5 hectares in size; 89,459 from 5 to 50 hectares; 2,392 from 50 to 100 hectares, and only 554 above 100 hectares (247.1 acres) in size. Many of the data presented are discussed with reference to their bearing on the present economic and social status of the rural population.

Work of the agricultural commission, 1907–8 (*Trav. Com. Agr.* [*Russia*], *1907–8, pp. 25+5+13, maps 39*).—The duties of this commission in Russia as prescribed by law are as follows: (1) To enable peasants to free themselves from the cumbersome and uneconomic methods of cultivating their holdings, which are now cut up into extremely small narrow strips; (2) to assist those peasants who possess only a very little land to increase it to an average-size holding by funds secured through the agricultural peasant bank or by the purchase of government land. The need of such a commission for relieving the agrarian situation in Russia is shown by the fact that in many villages part of the peasant land ("nadiel") received at the time of emancipation by each peasant has been subdivided into many lots, sometimes as high as a hundred, of insignificant narrow strips, and in others so scattered that sometimes some of them are situated more than six miles from the peasant's dwelling house.

The detailed work of the commission during the two years is described and illustrated in this report.

Agricultural credit (*Engrais, 25* (*1910*), *No. 13, pp. 355, 356*).—This is the text of the new French law of March 19, 1910, authorizing agricultural mutual credit societies to grant long-term loans to members in order to facilitate the acquisition, exploitation, and reconstruction of small holdings.

The union of the associations of the Alps and Provence, H. SAGNIER (*Jour. Agr. Prat., n. ser., 18* (*1909*), *No. 51, pp. 827, 828*).—This article summarizes the proceedings of the annual meeting held at Marseille, December 11 and 12, 1909. The union embraces nine departments of France and is composed of about 250 affiliated societies with 50,000 members.

The article shows that the farms in this section of France consist largely of small holdings, which fact has brought the associations into closer cooperative action and yielded greater returns to the farmers for their products than would have been possible without the union.

Agricultural cooperative societies in Egypt. B. P. NUBAR (*Égypte Contemporaine, 1910, No. 2, pp. 197–206*).—This article discusses the economic value to the small landowning class in Egypt of societies for the cooperative purchase and sale of farm products and of agricultural credit banks.

Egypt, so far as the rural population is concerned, is a country of small holdings. Of 1,090,000 rural proprietors, no less than 1,018,000 own lands ranging from about 1 to 10 acres in size. With a view to improving the economic condition of this class, and particularly to free them from the hands of professional money lenders, a commission was appointed by the Khedival Society of Agriculture to investigate and make suggestions regarding the best forms of cooperative societies adapted to Egyptian rural conditions. This paper, by one of the members of the commission, points out the objections that have been raised against the organization of such societies in Egypt, shows that the difficulties mentioned have been overcome in Germany, France, and other countries, and urges the government to pass a law whereby such cooperative societies can be easily organized. Such a law, it is believed, would open a new era of prosperity to small proprietors, the farm laboring class, and particularly to Egyptian agriculture.

Why is cooperation not more successful among farmers? J. E. JOHNSON (*Rpt. Agr. New Brunswick 1909, pp. 227–230*).—This is an address delivered

by the manager of the Norfolk Fruit Growers' Association at Guelph, Ontario, February 3, 1910.

The suggestions presented for making farmers' cooperative associations more successful than they have been in the past are for farmers to run their farms on business principles, keeping farm accounts, preserving confidence in other members, paying the managers good salaries, securing more knowledge along cooperative lines, obtaining more uniformity in the grading and packing of farm products, and the pro-rating of products, particularly apples, according to varieties, giving more attention to home markets, and carrying out the by-laws and the true spirit of cooperative associations.

The future position of the United States in the wheat and meat markets of the world, F. F. MATENAERS (*Deut. Landw. Presse, 37 (1910), Nos. 8, pp. 81, 82; 10, pp. 105–107*).—The author presents and discusses statistical data regarding the acreage and production of wheat in the United States from 1879–1908, inclusive, together with the exports of wheat and the increase of population during the same period. On this basis the conclusion is drawn that in 15 years time the United States will be able to supply only its own demand for wheat.

Similar data on live stock production for meat are presented, and it is contended that the United States has already lost first place in the world's market and will gradually reach the same position in this respect as for wheat.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 12 (1910), No. 5, pp. 33–40, fig. 1*).—Notes and statistics on the condition of crops in the United States and foreign countries, the farm values and prices of agricultural products, and a comparison of the monthly receipts of eggs and poultry in the chief markets for the first four months of 1909 and 1910.

Agricultural imports and exports in Denmark, 1908, N. C. CHRISTENSEN (*Tidsskr. Landokonomi, 1909, Nos. 11, pp. 608–622; 12, 693–698*).

AGRICULTURAL EDUCATION.

The relation of agricultural education to conservation, J. H. REYNOLDS (*So. Atlantic Quart., 9 (1910), No. 2, pp. 177–188*).—This article calls attention to the declining rate of exportation of agricultural products from the United States as evidence of the need of conserving the fertility of the soil, and suggests the following remedies:

(1) Strengthening the work of the U. S. Department of Agriculture, the state agricultural colleges and experiment stations, and the farmers' institutes and similar extension agencies; (2) a careful study of the work and influence of special agricultural schools of secondary grade; (3) making provision for the teaching of agriculture and domestic science in the ordinary public high schools; (4) the encouragement of agricultural courses for prospective teachers in the state normal schools; (5) the introduction of elementary agriculture into the elementary common schools; and (6) the development of additional special agencies for extending agricultural instruction directly to rural communities. The author holds that appropriations at least equal to those supporting "non-productive state institutions for the abnormal classes" should be made for the educational needs of normal society in a democracy.

Agriculture in the high school, M. H. BUCKHAM (*[Burlington, Vt.], 1910, pp. 6*).—This address, given to the students of the winter course in the University of Vermont, considers agriculture as a cultural subject worthy to be taught in all schools, on the ground that it is a group of sciences having "re-

sources which if wisely used would increase indefinitely man's health, wealth, energy, and enjoyment of life." A four-year course is suggested in which the first year should be given to "soils and all inorganic matter," the second to plant life, the third to animal life, and the last to "human life as affected by agriculture," including its economic, hygienic, intellectual, esthetic, moral, and social aspects. The belief is expressed that agriculture so taught would also have important vocational as well as cultural value in giving a more intelligent basis for the choice of agriculture as an occupation, and would tend also to induce interested students to follow up the "more strictly vocational aspects of modern science to agricultural art."

Agriculture in the public schools, W. C. Welborn (*Dallas Semi-Weekly Farm News, 1910, Jan. 7*).—This address, given at the Texas State Teachers' Association at Dallas, emphasizes the popular demand for school agriculture by citing resolutions adopted at various educational conventions, and points out the educational values of the subject. It contrasts the interest of pupils in "things that are at an average of 4,000 miles from home" with those within a radius of a mile from the schoolhouse. The author also points out the increase of individual earning power that comes from definite industrial training and suggests practical means of correlating agricultural study with other school subjects and with the vocational interests of the community.

Agriculture a fad, E. G. Cheyney (*Minn. Farm Rev., 15 (1910), No. 5, pp. 97, 98, 112*).—The author deprecates the demand for the rapid introduction of agricultural study into the schools of the Middle West before teachers have been properly prepared for such instruction. He holds that the "elements of agriculture are already known to most farm boys and that advanced instruction in practical farming is not possible in the rural schools." In city schools he believes that elementary agriculture would be both educational and highly interesting. He especially disapproves the belittling of "culture" that is frequently heard in the special agricultural schools, and regards the broadening influence of "art, music, philosophy, history, literature, and the like," as particularly needful on the farm as a compensation for the lack of urban advantages for amusement and social contentment.

Gardening in institutions, B. Hall (*Survey, 23 (1910), No. 25, pp. 939–946, figs. 9*).—This article describes the beneficial results that have come from garden work in reformatory institutions, hospitals, and training schools in various parts of the United States, particularly at the Bellevue Hospital Home (for tuberculous patients), the school gardens on Randall's Island, the State Agricultural and Industrial School at Industry, the New York Orphan Asylum at Hastings-on-Hudson, and the State Reformatory for Women, all in the State of New York; the Chilocco Training School, in Chilocco, Oklahoma; the Northampton State Hospital for Women, in Massachusetts; and the Ohio State Reformatory at Mansfield.

Little gardens for boys and girls, Myrta M. Higgins (*Boston and New York, 1910, pp. XI+153, pls. 8, figs. 4, dgms. 9*).—This book, based on the experience of the author, has been written for children "who have neither greenhouses nor old established gardens." Its aim is to explain clearly the simpler operations of gardening and "to arouse an interest in plant life that will be lasting and helpful." It deals with garden equipment, and the work of the different seasons and indoor gardening in winter.

Industrial contests for boys and girls, G. I. Christie and Henrietta W. Calvin (*Indiana Sta. Circ. 19, pp. 11, figs. 2*).—Corn-growing, bread-baking, and butter-making contests have now been organized in 45 counties of Indiana. Working plans are suggested for the organization of boys' and girls' clubs,

with directions for corn culture and records, contests in baking bread, canning fruit, and sewing, and exhibiting the products.

Agricultural extension.—II, Corn shows and selecting, preparing, and scoring exhibits, A. T. Wiancko and G. I. Christie (*Indiana Sta. Circ. 18, pp. 30, figs. 25, map 1*).—Rules governing exhibits at local corn shows are suggested and directions given for selecting, preparing, and arranging exhibits for corn judging in accordance with the score card.

The study of corn, V. M. Shoesmith (*New York, 1910, pp. IX+11–96, pl. 1, figs. 24, map 1*).—This book is prepared as a laboratory guide in corn judging for use in agricultural colleges and schools and as a guide to the farmer in the study of corn. It furnishes a comprehensive description of the various types and more popular varieties of corn, directions for selecting, judging, testing, shelling, and grading corn, a discussion of the relative value of ear characteristics as represented in the score card, and other data.

A study of corn, L. N. Duncan (*Bul. Agr. Dept. [Ala.], No. 33, pp. 16, figs. 8*).—This bulletin has been prepared as a guide to the school study of the corn plant. It furnishes outlines for a detailed examination of the entire plant, the foliage, ears, kernels, and cob, and includes the standard corn score card adopted by the Alabama Polytechnic Institute.

List of books on agriculture and related subjects prepared by short course department (*Mass. Agr. Col. [Pamphlet], 1910, March, pp. 15*).—This list is classified under the following heads: General farm reading, agricultural education, bacteriology, botany, dairying, domestic animals, domestic science, entomology, farm crops, fertilizers, floriculture, fruit, hygiene and physical training, landscape gardening, market gardening, mushrooms, poultry, rural social science, soils, trees and shrubs, and veterinary science. The author, date, and price of each book is given, but not the publishers.

MISCELLANEOUS.

Twenty-first Annual Report of Kentucky Station, 1908 (*Kentucky Sta. Rpt. 1908, pp. XV+510, pls. 64, figs. 5*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1908, a report of the director on the work of the station during the year, reprints of Bulletins 133 to 138, previously noted, and reports of analyses of mineral waters and meteorological data abstracted elsewhere in this issue.

Sixteenth Annual Report of Minnesota Station, 1908 (*Minnesota Sta. Rpt. 1908, pp. XXI+365, pls. 8, figs. 169*).—This contains the organization list; a list of the bulletins published during the year; a report of the director, including a financial statement for the fiscal year ended June 30, 1908, and brief summaries of the work of the various departments of the station, of which that of the veterinary division is abstracted on page 83 of this issue; and reprints of Bulletins 102 to 109, previously noted.

Annual Report of Nevada Station, 1908 (*Nevada Sta. Bul. 66, pp. 70, pls. 7*).—This contains the organization list and reports of the board of control, the director, and heads of departments. The report of the director includes a financial statement for the fiscal year ended June 30, 1908. The experimental work reported in the departmental reports is abstracted elsewhere in this issue.

Twenty-second Annual Report of Rhode Island Station, 1909 (*Rhode Island Sta. Rpt. 1909, pp. 155–199+VI*).—This contains the organization list, a report of the director on the work of the station during the year, including a summary of meteorological observations of the year which is abstracted on page 15 of this issue, and a financial statement for the fiscal year ended June 30, 1909.

Report of the director, 1909, H. L. RUSSELL (*Wisconsin Sta. Bul. 193, pp. 52, figs. 6*).—This contains the organization list, a report of the work of the station during the year, especially those phases dealing with administration, research, publications, and extension work, brief summaries of the publications of the year, lists of donations and exchanges, and a financial statement for the fiscal year ended June 30, 1909.

Twenty-fifth Annual Report of the Bureau of Animal Industry, 1908 (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1908, pp. 502, pls. 11, figs. 72*).—This contains a report of the Chief of the Bureau for the fiscal year ended June 30, 1908, numerous articles abstracted elsewhere in this issue, and a list of the publications of the Bureau during 1908. An appendix contains the rules and regulations of the Secretary of Agriculture relating to animal industry issued in 1908.

List of publications of the Rhode Island Agricultural Experiment Station, Kingston, R. I., available for distribution March 1, 1910 (*Rhode Island Sta. Bul. 139, pp. III–VII*).

A suggested revision of the terminology of agriculture, L. C. WOOSTER (*Emporia, Kans., 1910, pp. 7*).—The author proposes a reclassification of the materials utilized by plants, dividing them into plant foods, plant crude foods and food elements, and plant accessory foods.

AGRICULTURAL EXPERIMENT STATIONS.

The nature of agricultural research, J. HUDIG and U. J. MANSHOLT (*Cultura, 21 (1909), No. 250, pp. 322–331; 22 (1910), Nos. 257, pp. 1–16; 258, pp. 49–63*).—An extended discussion is presented of the purpose, methods, and functions of experimentation in agriculture with brief descriptions of the experiment stations at Lauchstädt, Dikopshof, and Rothamsted, the American and Danish experiment station systems, and the moor culture station at Bremen.

Report on the introduction of improvements into Indian agriculture (*Calcutta: Dept. Agr., 1909, pp. 25*).—This is a revision of a report of a committee of the Board of Agriculture of India, which was appointed "to consider and report on the best methods of bringing experimental work of proved value to the notice of cultivators." The various extension agencies at work in the various provinces of India are discussed, including the formation of local agricultural associations and village agencies, the holding of local demonstrations, the publication of leaflets and circulars and vernacular agricultural journals, the utilization of the general vernacular press, the encouragement of agricultural shows and exhibitions. the employment of itinerant instructors and individual expert cultivators, the operation of seed farms and depots, the management by improved methods of Court of Wards estates, colonization with expert cultivators, and the training of sons of cultivators.

The necessity of a thorough understanding by experimentalists and extension workers of local conditions is emphasized, and special stress is laid on concentrating work in comparatively small areas, winning the confidence of the natives, and encouraging in them a spirit of inquiry.

NOTES.

Arizona Station.—Dr. W. B. McCallum has resigned as associate botanist to accept a commercial position in Mexico, his resignation taking effect July 1.

Arkansas University and Station.—At a recent meeting of the board of trustees additional appointments in the college of agriculture and station were made as follows: P. N. Flint, of the Georgia Station, as professor of animal husbandry and animal husbandman; R. C. Thompson, assistant chemist at the Kansas College and Station, as first assistant in agricultural chemistry; J. G. Stahl and H. E. Stevens as assistants in plant pathology; George G. Becker, assistant in entomology; J. M. Borders, instructor in agricultural education; and E. J. Thompson as assistant in animal husbandry. W. S. Jacobs, adjunct professor of agriculture and assistant agriculturist, has resigned to engage in work in Canada.

Colorado Station.—L. G. Carpenter has resigned as director of the station and has been succeeded by the entomologist, C. P. Gillette.

Connecticut State Station.—The new laboratory building is nearing completion. A portion of it comprises the addition to the original laboratory building, which was being built at the time of the burning of the latter in January, and the remainder is a restoration of the burned portion. The whole now forms one building of uniform and nearly fireproof construction, with two stories and basement of brick and reinforced concrete, and 96 by 64 feet in size.

The basement contains a laboratory, machinery room, sampling, storage, and spraying apparatus rooms, and a fireproof vault. On the first floor are a large chemical laboratory, with office, storerooms, and library, the forester's office and workroom, rooms for the botanical library and collections, the botanist's office and laboratories, and a second fireproof vault. The second floor contains three chemical laboratories, with an office, library, and storerooms, and rooms for the entomological collections, library, office, and laboratories.

Outside of the building but connecting with it is a two-story addition of glass and concrete, containing an insectary and a greenhouse for the study of plant diseases.

Florida University and Station.—The new station building, costing $40,000, is nearing completion, and it is expected to begin the installation of equipment, for which a grant of $7,500 is available, soon after July 1.

R. N. Wilson, of Guilford College, N. C., and formerly assistant chemist in the station, has been appointed assistant in extension work in the university. During the fiscal year ended June 30, 122 farmers' institutes were held with a total attendance of about ten thousand. A considerable amount of other extension work was also carried on, including a series of boys' corn institutes in Alachua County, in which over five hundred participated, and a special course in technical citrus culture, known as the citrus seminar, which was attended by 28 growers.

Illinois University and Station.—The resignations are noted of Ralph B. Howe as instructor in pomology in the college of agriculture and field assistant in pomology in the station, to engage in commercial work; of Clyde H. Myers, as assistant chemist in the station, to take up graduate work at Cornell University;

and of D. L. James, as assistant in dairy husbandry to engage in commercial work.

Iowa College.—Data recently compiled as to the occupations of the 884 graduates during the past ten years whose present occupation is known, show that 57 are engaged in teaching, research, and expert work in agriculture, and 132 in farming.

H. J. Evans has been appointed instructor in dairying and has entered upon his duties.

Kansas College and Station.—*Industrialist* notes that A. G. Phillips, assistant in poultry husbandry in the college and poultryman in the station, has accepted a position in charge of the new poultry division in the Indiana Station, beginning August 1. A farmers' convention, to bring before the people of the State the very extensive field trials and other experiments at the Fort Hays substation, was held at Fort Hays June 6 and 7.

Kentucky University and Station.—Judge Henry S. Barker, chief justice of the State Court of Appeals, has accepted the presidency of the university, and will enter upon his duties January 1, 1911. At the last meeting of the board of trustees, a board of control for the station was appointed as follows: R. C. Stoll, chairman, Lexington; C. B. Nichols, Lexington; L. L. Walker, Lancaster; Acting President James G. White of the university; and Director Scovell of the station. A committee consisting of this board and the executive committee of the university was appointed to reorganize the college of agriculture.

Bills appropriating $30,000 for substations, $10,000 for seed inspection, and $20,000 annually for the maintenance of the university were passed by the last legislature, but vetoed by the governor because of insufficient funds in the state treasury. A bill appropriating $2,000 for the preparation and distribution by the station of hog-cholera serum was enacted.

W. H. Scherffius has resigned as agronomist and William Rodes as assistant chemist. They have been succeeded respectively by George Roberts, now chemist of the fertilizer division, and B. D. Wilson. D. J. Healey has been appointed bacteriologist and microscopist.

Maine University and Station.—Dr. George E. Fellows has resigned as president of the university. Alfred K. Burke and Raymond P. Norton, 1910 graduates of the university, have been appointed assistant chemists in the station, their appointments dating from July 1 and September 1 respectively.

Maryland Station.—C. L. Opperman has resigned as associate poultryman to accept a position in the animal husbandry investigations of this Department, his resignation becoming effective July 1. Dr. George E. Gage has been promoted from associate biologist to biologist. Charles O. Appleman, Ph. D., of Chicago University, has been appointed plant physiologist and chemist, and on September 1 will enter upon investigations under the Adams Act. Thomas R. Stanton, a 1910 graduate of the college, has been appointed assistant agronomist and has entered upon his duties.

Michigan College and Station.—The retirement is announced of Dr. W. J. Beal after 40 years of continuous service as botanist. *Science* announces that he will be succeeded by Dr. Ernst A. Bessey of the Louisiana University.

Nebraska University and Station.—W. L. French, adjunct professor of dairy husbandry, has been appointed assistant in dairy husbandry in the station.

Cornell Station.—The department of plant pathology announces the establishment of two additional industrial fellowships, making a total of four now available for investigations of plant diseases. The new fellowships have been provided by commercial firms and are to be known as the Herman Frasch and John Davey fellowships. The former, which is to be devoted to an investigation of the use of dry sulphur as a fungicide, carries an appropriation of $3,000

a year for four years and provides for a senior and junior fellow. C. N. Jensen, formerly an assistant in the department and at present research fellow in the University of California, has been appointed senior fellow, and F. M. Blodgett, a 1910 graduate of the college of agriculture, junior fellow. The second fellowship supplies $750 annually, and is for the investigation of heart rots of trees. W. H. Rankin, a 1910 graduate of Wabash College, has been appointed to this fellowship.

Ohio University and Station.—The recent legislature appropriated $50,000 for work in agricultural extension. A considerable portion of this amount will be spent in holding one-week extension schools throughout the State. During the past year 34 such schools were held, and it is hoped to double this number during the coming year.

At the station, contracts have been let for the erection of a soil laboratory, 23 by 30 feet in size, one and one-half stories high and of stone and slate construction, and also for a one and one-half story brick power house, 34 by 39 feet. A dwelling near the main building has been purchased and will be used for office purposes until funds can be secured for the erection of additional office and laboratory buildings.

E. S. Guthrie has been appointed chief of the new department of dairy husbandry, and J. W. Hammond has been appointed assistant in the department of animal husbandry, with special charge of the wool investigations recently authorized. E. G. Arzberger has been appointed assistant botanist, and George G. Boltz, a 1910 graduate of the university, assistant chemist. Thomas F. Manns has been transferred from the department of botany to that of soils, and will conduct investigations in soil bacteriology.

Clemson College.—The legislature has authorized the establishment of two additional scholarships. An appropriation of $1,500 was also authorized for the State Corn Breeders' Association, under the direction of the president of the association, the commissioner of agriculture, the superintendent of school extension, and the professor of agriculture of the college, provided that $4,000 additional is raised by the association.

Oregon College and Station.—H. S. Jackson, research assistant in plant pathology in the station, has been appointed professor of botany and plant pathology in the college. W. E. Lawrence, assistant in horticulture and botany at the Oklahoma College, has been appointed instructor in horticulture.

West Virginia University.—Press reports announce that President D. B. Purinton has tendered his resignation, to take effect in June, 1911.

Wyoming University and Station.—J. D. Towar, professor of agriculture and director of the station, resigned July 1 to return to Michigan, where he will engage in farming, and has been succeeded by the chemist, H. G. Knight.

Sugar Planters' Experiment Station in Porto Rico.—An experiment station is being organized under the auspices of the Association of Sugar and Sugar Cane Producers of Porto Rico. This association was formed in San Juan, February 25, 1909, and is financed by a tax of 25 cents on each ton of sugar refined or two and a half cents for each ton of cane produced. One of its standing committees is the agricultural committee, which has for one of its duties the establishment of model farms, experiment stations, and a technical sugar school.

J. T. Crawley, formerly director of the Cuban Station, has been selected as director of the experiment station, and will enter upon his duties in August. It is planned to secure in the near future a chemist, a plant pathologist, an entomologist, and a field expert. A suitable location for the station is being sought. D. W. May, special agent in charge of the Porto Rico Federal Station, has been appointed an honorary member of the agricultural committee and is acting in an advisory capacity in the establishment of the station.

American Association of Pathologists and Bateriologists.—The tenth annual meeting of this association was held May 3 to 5, at Washington, D. C. An important feature of the meeting was a symposium on artificial immunity, presided over by E. L. Trudeau. The topics discussed were The Formation of Antibodies, by L. Hektoen, of the University of Chicago; The Relation of Anaphylaxis to Immunization, by F. P. Gay, of Harvard University; Immunization in Nonbacterial Diseases, by S. P. Beebe, of Cornell University; and a general discussion on the above topics by J. G. Adami, A. Stengel, L. Loeb, and J. F. Anderson.

New Journals.—The *American Breeders' Magazine* is being published as a quarterly by the American Breeders' Association, under the editorship of Assistant Secretary Willet M. Hays of this Department, as secretary of the association, N. E. Hansen, secretary of the plant section, and H. W. Mumford, secretary of the animal section. The initial number contains an article on the field and outlook of the new journal, by Secretary James Wilson, of this Department; brief illustrated sketches of the work of Darwin, Mendel, and Cruikshank; articles on Increasing Protein and Fat in Corn, by L. H. Smith, of the Illinois University and Station, New Methods of Plant Breeding, by G. W. Oliver, of the Bureau of Plant Industry of this Department, The Army Horse, by Carlos Guerro, and Poultry Breeding in South Australia, by D. F. Laurie; reports of several committees of the association on some phase of their work; editorials; announcements; and notes.

Bulletin Bibliographique Hebdomadaire is being published by the International Institute of Agriculture. Each number contains lists of the weekly acquisitions to the library of the institute. These are arranged in three sections, the first enumerating the accessions and classifying them according to the Dewey decimal system; the second listing in a similar manner articles of general interest to the institute selected from the journals received; and the third listing by countries the journals received.

The Mendel Journal is being published monthly by the Mendel Society of London. Its object is announced in the initial number as to present Mendelism "to a wider public by men who believe in its truth," and to collect data regarding the science of genetics, especially as applied to man. Aside from an article on Parthenogenesis in Nicotiana, the initial number deals largely with eugenics. It is announced that in future numbers prominence is to be given to agricultural and horticultural practices and problems.

Miscellaneous.—Under an act passed April 11, the Philippine Bureau of Agriculture has been transferred from the Department of the Interior to the Department of Public Instruction. Archibald R. Ward, assistant professor of veterinary science and bacteriology in the California University and Station, has accepted a position as chief veterinarian in the bureau, and will sail from San Francisco early in July to enter upon his new duties.

Arthur C. Monahan, a 1900 graduate of the Massachusetts Agricultural College and at present principal of the high school at Turners Falls, Mass., has been appointed specialist in agricultural education in the United States Bureau of Education.

Dr. C. B. Plowright, well known for his monograph of the British Uredineæ and Ustilagineæ, died in April at the age of 61 years. In addition to the above work he contributed more than one hundred papers on systematic mycology and plant pathology to scientific journals.

EXPERIMENT STATION RECORD.

VOL. XXIII. AUGUST, 1910. No. 2.

The four American experiment stations located outside of the continental United States illustrate anew the universality of certain fundamental problems in agriculture, and the broad application of the experiment-station idea alike in the Tropics and the far north to primitive and to highly specialized conditions of production. These stations, located successively in Alaska, Hawaii, Porto Rico, and Guam, are making noteworthy progress in both practical and scientific lines, and, like the state stations, are already proving essential elements in the rational development of the agriculture of their respective localities. From their isolation and the character of their publications their work is less familiar than that of the home stations, but it possesses many features of general, and some of special, interest.

When these stations were established diversification was adopted as the general aim in each case. This has been continued as the most profitable policy where agriculture is so slightly developed as in Alaska, so specialized as in Hawaii and Porto Rico, and so primitive as in Guam. Naturally much of the work at each station has been of an elementary nature, but fundamental problems have been recognized as calling for thorough-going investigation and the adaptation of the results of inquiry to the special conditions presented.

One of the important lines of work has been a study of the soils. Soil investigations in the Tropics and in Alaska are of special importance, since the conditions are quite unlike those of temperate climates where most soil studies have been made, and generalizations based on earlier work are not applicable except in a very restricted way.

In Porto Rico there are areas in cane fields, pineapple plantations, and coffee estates where the soils appear fertile, so far as ordinary physical and chemical examinations go, but fail to produce profitable crops. Such soils are variously designated as "tired" or "sick" and in most cases are not benefited by ordinary applications of fertilizers. Plants grown on these soils exhibit some of the conditions of mosaic diseases, a lack of chlorophyll in parts of the leaves, followed by a browning of the tissues. Investigations showed that these soils contain an excessive amount of butyric acid formed by the fermentative

activity of soil organisms. Several species of anærobic or facultative anærobic bacteria were found in abundance in the soil, where they developed with great rapidity, forming butyric acid wherever there were roots or other organic matter capable of supplying the requisite carbohydrates. Experiments in destroying the bacteria showed that by the injection into the soil of carbon bisulphid, creolin or other germicides, the trouble was corrected. The cost of the carbon bisulphid required for the treatment is so great as to make its use almost prohibitive on a field scale, and as a consequence a number of experiments are in progress to bring the treatment within the range of economic use.

A study is also in progress on the catalase of soils; and as bacteria are one of the chief sources of catalase, the soil treatment mentioned above is found to have an inhibiting effect on the catalytic action of soils.

In Hawaii studies of the soil were among the earliest scientific investigations taken up by the station. The total nitrogen content of some of the soils was found to be higher than the crop production would indicate, and investigations showed much of the nitrogen to be present in organic forms that are not available for plant growth, if not actually detrimental.

Much attention has been given to the study of pineapple soils. In certain sections pineapples do not thrive. The young plants start off well, but in a few months the leaves turn yellow and many of the plants never bear fruit, or if any is produced it is inferior in both size and quality. An examination into the probable causes for this showed the presence of an unusual amount of manganese in the soils, in some cases as much as 5 per cent of manganese oxid. Such soils are black and apparently very fertile, but the manganese forms a deposit about the roots, interfering with their functions. The degree of yellowing of the plants was found to be in direct proportion to the percentage of manganese present. The red soils of the islands showed less manganese and were better adapted to pineapple growing than the black type, the dark color of which is attributed to the presence of the higher oxids of manganese. Experiments are in progress to correct the influence of abnormal amounts of manganese, and in the meantime the planting of this crop on such soils is advised against.

Another study which has connection with soil work is the use of commercial fertilizers in the growing of rice. The rice soils of Hawaii are largely of volcanic origin, and in spite of the submerged culture they puddle very poorly and there is a great loss of fertilizers through leaching. As a result of studies made by the station, the substitution of sulphate of ammonia for nitrate of soda has been followed with excellent results. These experiments also indicate that the oriental practice of applying a considerable amount of the fer-

tilizer with the flood water when rice is heading is not justified, so far as Hawaiian conditions are concerned. The possible waste of such late applications has been clearly demonstrated.

In Alaska a soil problem of great importance has been worked out. In that country much of the land is covered by a layer of moss of considerable depth. It has been the practice to plow the moss under when preparing land for cultivation, but this practice has been found to be ill advised and to injure the suitability of the soil for crop production. In the cold soils the moss is very slow in rotting, and there appears to be a tendencey for a greater acidity to develop under such conditions. Various experiments have been carried on to solve the problem of the disposal of the moss, and it has been found that a better plan than plowing under is to tear up the moss by light plowing, followed by harrowing, and after it has become dry to burn it. By this method uniform stands and good crops have been obtained the first season, whereas several years are generally required for equal results if the moss is plowed under. The practical application of this discovery will be of great importance in the development of that country.

An important line of work at each of the insular stations has been the introduction and breeding of new economic plants. In Alaska much attention has been given to the testing of varieties of field and garden crops, to get those that will ripen in the short season; and in many instances it is now possible to recommend varieties that may be expected to do well in the different parts of that country. Through the Section of Seed and Plant Introduction of this Department many varieties of plants have been secured from high latitudes in Europe and from the elevated portions of southern Asia, and with some of these very promising results have been obtained. Breeding and acclimatization work with cereals is being carried on, especially at the stations located in the great valley regions of the country, and locally developed forms have been obtained that mature earlier than the same varieties from seed produced outside of Alaska. It has been found practicable to grow cereals in the valleys of the Yukon and Tanana rivers. Trials have been made of many varieties of oats, barley, rye, and wheat, and of the first two there are now known varieties that can be reasonably expected to ripen every year. The work has involved not only the introduction of the grains but the establishment of early maturing strains of varieties through the continued selection of the earliest maturing heads. Some hybridizing of varieties of barley has been undertaken, with every promise of success. A successful effort has been made to produce hybrid strawberries, crossing the well-known wild species with a cultivated variety. A large number of first generation hybrids have been obtained, some of

which combine the hardiness of plant of the wild type with the size of fruit of the cultivated one. Hybrids have also been secured between the cultivated raspberry and the wild salmon berry, although none has fruited as yet. With vegetables marked success has been attained by the Alaska Stations, and it is now possible to recommend varieties of the more common and hardy vegetables for the principal regions of the country. This information is of inestimable value in a new and undeveloped country like Alaska, as it makes possible the addition of many vegetables to the dietary of the people, who might otherwise suffer in health by too restricted diet.

In Porto Rico the most important introductions thus far have been seedling sugar canes which are not only more productive of cane but yield a higher percentage of sugar and are more resistant to pests of all kinds; varieties of coffee better suited to the American taste; citrus and other kinds of tropical fruits; forage and green-manuring crops, etc. In Hawaii the station was instrumental in the introduction of the Bluefields or Jamaica banana, which bears shipment better than the varieties locally grown before the advent of the West Indian form; the introduction of many important forage crops; the spread of rubber cultivation; introduction and breeding of improved varieties of rice; cotton production, etc. In Guam the introduction of forage plants and demonstration of improved methods of cultivation are at present receiving the principal attention.

In connection with the policy of diversification of agricultural products, the stations have undertaken the restoration of industries that formerly flourished but had become unprofitable under altered conditions. In Porto Rico much work has been done with coffee, and as stated in a previous issue (E. S. R., 23, p. 4) many important facts have already been determined which will aid greatly in placing the coffee industry of the island on a more satisfactory basis.

In Hawaii considerable work is being done to reestablish cotton culture upon a profitable basis, and this is proving one of the notable features of the station's activity. About four years ago the station began experiments with cotton, with a view to the development of an industry adapted to areas where sugar cane can not be profitably grown on account of an insufficient water supply. All the leading types of cotton were secured and culture and breeding work begun. The best results have thus far been secured with Sea Island and Caravonica cottons, and the yield and quality of the fiber of some of the strains leave nothing to be desired.

In this work a number of features have been introduced that are unusual in cotton growing. Both the Sea Island and Caravonica cottons are being grown as perennials. The plants are widely spaced, and are vigorously pruned every year. In this way not only is the shape of the plant controlled, but by the date of pruning the develop-

ment also can be controlled so that the cotton picking season will come at the time when there is the least demand for labor upon the sugar plantations. Another important discovery is that the prunings if used as cuttings root and develop rapidly. Sea Island cotton does best when pruned to a low stump, while with the Caravonica it is advantageous to cut away from one-third to three-fourths of the previous season's growth. By this rigorous pruning from 50 to 100 cuttings can be obtained from a single plant.

In addition, it has been found practicable to bud or graft cotton plants, thus propagating desirable individuals. Advantage has been taken of the possibility of vegetative reproduction to produce rapidly strains from individual plants that possessed desirable qualities. This removes the possibility of undesirable accidental crossing, which has discouraged many a cotton breeder when the crop was grown as an annual.

Just how long cotton can be profitably grown as a perennial under field conditions without replanting is yet to be determined. The preliminary experiments with this crop have been so successful that a number of planters have taken up cotton growing in connection with their cane production. either on land not wholly suited to cane or as a possible rotation crop.

Another important line of work in Hawaii has been the breeding and cultivation of rice. A number of hybrids of great promise have been produced which are now being cooperatively grown on a considerable scale. In addition to these hybrids the station has secured a large number of the most highly prized Chinese and Japanese varieties for further breeding experiments.

The shipping and marketing of tropical fruits on the mainland is a matter of great importance in both Porto Rico and Hawaii which has received the attention of the stations in those islands. These experiments have been made not only with fruits that are considered strictly tropical, such as pineapples, bananas, mangoes, and avocados (alligator pears), but also with all kinds of citrus fruits. The investigations have involved a number of problems in ocean transportation, but they have also shown the necessity of care in picking, packing, and handling. In accordance with the investigations of this Department in California and Florida, it is evident that extreme care in picking and handling fruits is a prime requisite in the successful marketing of these extremely perishable products. With proper handling it was found feasible to market in Chicago fresh pineapples and avocados from Hawaii, when fruit shipped with the customary treatment was often so badly decayed on reaching San Francisco as to make its shipment unprofitable.

In Porto Rico and Alaska some attention is being given to the introduction of live stock with a view to the improvement of that now common. Marked success has been attained with Galloway cattle in Alaska, where they have proved hardy and well adapted to the country. Improved horses, cattle, swine, and fowls have been introduced by the Porto Rico Station, and the demand for their progeny greatly exceeds the station's supply. The active interest in animal breeding in Porto Rico is considered a very hopeful sign of appreciation of the station's efforts.

Apart from these specific features of the stations' work, a broader result has been to demonstrate the feasibility of a varied agriculture in an untried field like Alaska, a conclusion of the greatest importance to a permanent population and the development of that territory, and the application of scientific methods to a greater diversity of agricultural production in Hawaii and Porto Rico. The skepticism with which these undertakings were looked upon locally has been replaced by a confidence in their possibilities and an appreciation of agricultural experimentation, which augur much for the future usefulness of these stations.

The death of Robert Koch, which took place on May 27 at Baden Baden where he had gone in search of health, removed the second of the two great founders of modern bacteriology and establishers of the germ theory of infectious diseases. Few men accomplish more for a science, for the methods of investigation, and for humanity directly than he did in the sixty-six years of his life. His epoch-making studies, his versatility, and the practical outcome of his work give him a high place in science and among the benefactors of the human race.

Doctor Koch was born December 11, 1843, in Klausthal, Prussia. He passed through the gymnasium and at the age of nineteen began the study of medicine at the University of Göttingen, graduating in 1866. While there he came under the influence of such leaders in science as Friedrich Woehler, the chemist, who first produced urea synthetically, Wagner the physiologist, and Jacob Henle, the great anatomist.

After serving for a short time as assistant physician in the General Hospital at Hamburg, he took up the practice of medicine at Langenhagen in Hanover. At that time he seriously considered coming to the United States, where two of his brothers had already established themselves. Soon afterward he removed to Rackwitz, a small place in Posen, and in 1872 became district physician in Wollstein. In 1879 he was called to Breslau as a public medico-legal officer, but soon returned to Wollstein, where he remained but a few months before being called, in 1880, to the Imperial Board of Health in Berlin.

At the time Koch commenced his investigations in the early seventies, Pasteur had already corrected the mistaken idea of spontaneous generation of microbes, and had published epoch-making researches which through Lord Lister had been applied in the antiseptic treatment of wounds; but the road had been but partly opened, the connection between bacteria and infectious diseases still being obscure, and it remained to be determined whether the bacteria found in certain diseases were causative or merely consequential agents.

While practicing in the country, Koch carried on investigations with anthrax and traumatic infective diseases. Although the etiologic significance of the anthrax bacillus had previously been demonstrated by Davaine, it remained for Koch to determine the conditions under which spores are formed and the part that they play in the spread of the disease in nature. Five years later he published valuable researches relating to the resistance of anthrax spores to heat and chemical agents. This work in 1876 and the appearance in 1878 of his monograph on researches in the etiology of traumatic infective diseases marked the definite beginning of exact bacteriologic-etiologic investigation.

Koch's work in Berlin in 1880 is said to have begun in a small room with one window, with Loeffler and Gaffky as assistants. Here the investigations of anthrax were continued and photomicrography and new culture methods, including the perfection of the transparent solid media, were worked out. In the introduction of the so-called plate method of obtaining pure cultures of bacteria, an invaluable means was furnished by which a single bacterial species or strain could be isolated from a mixture of many. It was a most important advance in bacteriological technique. In 1880, simultaneously with Eberth, but independent of him, he discovered the typhoid bacillus.

On March 24, 1882, Koch startled the world by announcing the discovery of the tubercle bacillus as the cause of the dread disease tuberculosis. He demonstrated the presence of the tubercle bacillus in the diseased tissue of tuberculous animals and in the sputum and tissues of human beings suffering from the disease. His ingenuity and mastery of methods enabled him to stain the organism in the tissues and to isolate and study it on artificial media outside the body—a task which many others had attempted but failed to accomplish.

He continued his investigations on tuberculosis as opportunity offered, and in 1901 announced his conclusion that human and bovine tuberculosis are due to different types or strains of the bacillus, as pointed out by Theobald Smith. But he went further, holding the view that bovine tuberculosis is of minor importance in the develop-

ment of tuberculosis in man, and emphasizing that the chief danger to man is from the human type, which does not affect cattle. His conclusion that the transmission of the bovine disease to man takes place rarely or not at all through the milk or flesh of diseased animals met with much opposition, and has not been generally accepted; but he held to it and at the International Congress on Tuberculosis in 1908, which met in this country, he reiterated this view.

In 1890, Koch announced his discovery of tuberculin (old tuberculin), and expressed the belief that in it a specific cure for tuberculosis had been found. This aroused the greatest interest throughout the world, and speedily became the subject of widespread investigation into its curative and diagnostic properties. His "new tuberculin" was brought forward in 1897.

After his masterly work on tuberculosis, Koch was naturally looked upon as the man most likely to solve the complicated problem connected with cholera epidemics. In 1883 he was sent to Egypt on this quest, the disease then threatening to invade Europe; and from there he proceeded to India to continue his studies. The result was the discovery of the comma bacillus as the cause of cholera, a classic investigation recognized as one of the greatest triumphs of his life work. On returning to Germany in 1884, he was rewarded for his labors by a gift of 100,000 marks from the government, and the following year was appointed a professor at the University of Berlin and director of the new Hygienic Institute. This position he occupied until 1891, when he was appointed director of the newly founded Institution for Infectious Diseases in Berlin.

Koch's investigations on rinderpest in Africa in 1896 resulted in the discovery that cattle can be immunized against the disease for a period of several months, through the injection of bile taken from animals which have been sick with the disease for six or eight days. Other investigations followed on bubonic plague, surra, African coast fever, and malaria. His work upon the latter led to his recommendation of the preventive administration of quinin to people as a means of destroying the plasmodia in infected individuals, or preventing their development, in malarial districts, and thus ridding a community of malaria. Koch also studied various protozoan diseases in German East Africa in 1904, and in 1906 he visited the interior of Africa to study sleeping sickness and means for its prevention, meeting, however, with only partial success.

Through the development of exact methods of investigation which resulted in placing bacteriology on the basis of an independent biologic science Koch made possible the present advanced state of our knowledge of infectious diseases. That he himself contributed much to this knowledge will be evident from the record of his remarkable activity, which was crowned with such large measure of success. In the discovery of the tubercle bacillus and the fact that tuberculosis is

a preventable disease, he pointed a way to combat and to reduce the most fatal affliction of man and beast. With the discovery of tuberculin, a most valuable method of early diagnosis of tuberculosis in man and animal was added to our combative equipment. The application of the tuberculin test in cattle has made practical the isolation of infected from uninfected animals, provided means against its spread, and greatly reduced the possible source of transmission of the disease from beast to man. In some localities in the United States, England, and Germany the mortality from the white plague has already been reduced to nearly one-half of what it was prior to Koch's discovery of the tubercle bacillus. His investigations of anthrax and rinderpest have also resulted in great benefits to man and to animal industry.

The record of the work of such a man as Koch is his greatest and most lasting monument, but the honors accorded him on all sides show the high regard in which he was held. He was an honorary member of nearly all the great scientific societies of the world, received honorary titles and degrees from German and foreign universities, and was decorated by nearly all the monarchs of Europe and by the Emperor of Japan. The German Government recently made him a privy councillor with the title of Excellency. He was awarded the Nobel prize in medicine in 1905.

In his death the whole world has lost a master, one whose name will remain for time on the roll of the great in science.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The color reactions of the proteins (egg albumen), I. C. REICHARD (*Pharm. Ztg., 55 (1910), Nos. 16, pp. 158–160; 17, pp. 167, 168*).—A study of the color reactions produced with desiccated and powdered egg albumen and various reagents, among them sulphuric, acetic, hydrochloric, fuming hydrochloric, nitric, trichloracetic, amidoacetic, molybdic, sulphanilic, picric, titanic, iodic, vanadic, and metaphosphoric acids, ammonium heptomolybdate, potassium hydrate, copper sulphate, silver chlorid, vanillin, urea, and phenylhydrazin.

Proteids in the seeds of Pinus koraiensis, K. YOSHIMURA (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 5, pp. 257–260*).—A proximate analysis of these pine nuts is reported, as well as determinations of the proportion of histidin, arginin, and lysin.

Some contributions to our knowledge of stachyose, C. NEUBERG and S. LACHMANN (*Biochem. Ztschr., 24 (1910), Nos. 1–2, pp. 171–177*).—The authors have perfected a method for extracting and purifying stachyose, the resulting product having all the characteristics of the tetrasaccharid isolated by Schulze, Planta, and Winterstein. When stachyose was treated with emulsin for a period of 3 months no substance having the characteristics of δ-galactose was found, though reducing substances were formed. With yeast maltase after a period of 3 days the stachyose solution showed evidences of a right-handed rotation, and eventually yielded a substance having the characteristics of dextrose and an osazon with the characteristics of the trisaccharid manniotriose. Kefirlactase also produced a phenyl osazon.

Contribution to our knowledge of the nitrogen-free extract substances in foods and feeding stuffs, J. KÖNIG and W. SUTTHOFF (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 4, pp. 177–189*).—Previously noted from another source (E. S. R., 22, p. 111).

The influence of acids and alkalis on the activity of invertase, C. S. HUDSON and H. S. PAINE (*U. S. Dept. Agr., Bur. Chem. Circ. 55, pp. 7, figs. 2*).—"Acids and alkalis are found to affect the purified enzym invertase in two ways; in small concentrations they influence its activity but do not permanently destroy it, in larger concentrations they accomplish its destruction. The destruction by acid at 30° C. reaches a barely noticeable rate at 0.01 normal acidity and increases rapidly with the acidity until it becomes almost instantaneous at 0.05 normal. The rate of destruction follows the formula for unimolecular reactions. The alkaline destruction begins a little below 0.01 normal and is almost instantaneous at 0.045 normal. The activity of invertase in acid solutions, which are not strong enough to destroy the enzym, was measured for hydrochloric, hydrobromic, nitric, phosphoric, sulphuric, boric, oxalic, tartaric, citric, and acetic acids; the activity depends almost entirely on the concentration of hydrogen ions in the acid solution and the various acids thus show typical differences which correspond with their recognized degrees of dissociation. The activity of invertase is zero in alkaline solutions, rises to a maximum in very weakly acid ones, and decreases with stronger acidity."

The proteolytic ferments in the seeds employed as feeding stuffs, R. GIESEN (*Über die Proteolytischen Fermente der als Futtermittel benutzten Körnerfrüchte. Inaug. Diss., Univ. Bern, 1909, pp. 34*).—The author was able to show that protease exists both in the endosperm and the bran of cereals, and points out that its value in the latter furnishes a scientific reason for the practice of feeding bran to animals having digestive disorders, particularly old animals. Several legumes were also examined for the presence and content of protease. In each instance the enzym was extracted by glycerol and its activity exerted on the gelatin plate in Petri dishes and compared with trypsin and pancreatin solutions of known strengths. The results are summarized in the following table, the percentage content of enzyms being calculated as trypsin:

Relative activity of the proteolytic ferments in various seeds and the percentage content of enzyms.

Kind of seed.	Period of minimum action of seed.	Period of maximum action of seed.	Period of minimum action of bran.	Period of maximum action of bran.	Enzym content of the seed.	Enzym content of the bran.	Character of the optimum medium.	Optimum temperature.
	Hours.	*Hours.*	*Hours.*	*Hours.*	*Per ct.*	*Per ct.*		*Degrees C.*
Rye	1	4	1	3	0.50	0.9	Neutral and alkaline	30-45
Barley	2	6			.26		do	30-40
Corn	2	6			.28		do	30-40
Wheat	1	4	1	3	.65	1.1	do	30-40
Rice	1	4			.70		do	30-40
Oats							Neutral	30-40
Beans	4-5	6			.24		Acid and neutral	30-40
Peas	3-5	6			.28		Neutral	30-40
Vetch	1	4			.65		do	30-40
Lentils	2-4	5-6			.29		Acid and neutral	30-45

Maltase and glucosid-splitting ferments, J. ZELLNER (*Monatsh. Chem., 30 (1909), No. 8, pp. 655–662; abs. in Ztschr. Angew. Chem., 23 (1910), No. 6, p. 275*).—The author seeks to prove his theory that maltose, when formed in fungi by diastasic action, is at once further hydrolyzed by a maltase in the fungus. His test was carried out with extracts of various tree-inhabitating fungi and maltose.

The results indicated a strong hydrolysis of the maltose, thereby demonstrating the presence of maltase. The glucosid-splitting enzyms which were present in the fungi which inhabit willow trees were different from those which were present in the tree itself.

The use of pure cultures for pickling cucumbers, A. KOSSWICZ (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 11, pp. 757–770*).—The results of the tests indicate that the lactic-acid bacteria isolated from fermenting garlic and pearl onions are satisfactory for acidifying cucumbers and preventing their softening, the preference being given to the garlic bacteria. Tannic acid was also found satisfactory for preventing softening.

An attempt was also made to discover the cause of foaming fermentation.

The use of fruit sugar for priming wines, W. I. BARAGIOLA (*Schweiz. Wchnschr. Chem. u. Pharm., 48 (1910), No. 10, pp. 149–152*).—The author, after discussing the laws of different countries in regard to the use of sugar for priming wines, concludes that beet sugar should be employed for this purpose, as fruit sugar presents no advantages over it.

Desulphiting of wine by hexamethylenetetramin, ROUILLARD and GOUJON (*Ann. Falsif., 3 (1910), Nos. 15, pp. 14–16; 16, p. 60*).—The authors propose a test for wines which have been desulphited with hexamethylenetetramin. On

adding a portion of the distillate from the wine, obtained by distilling with phosphoric acid without utilizing a stream of carbon dioxid, to a solution of bisulphite of rosanilin, a violet coloration is obtained.

The action of minutely distributed metals on olive oil, W. VAN RIJN (*Pharm. Weekbl., 45 (1908), No. 13, pp. 347, 348; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 4, p. 224*).—Olive oil which had been heated for 6 hours with finely powdered magnesium, aluminum, zinc, manganese, iron, nickel, copper, lead, and tin yielded the following results: Magnesium, zinc, copper, lead, and manganese were dissolved to a degree in the oil and this resulted in a diminution of the acid value of the oil. Aluminum, nickel, and tin had no effect on the oil whatever, and it was impossibe to detect these metals in the ash of the oil.

The addition of carbonate of potash to cocoa, BORDAS (*Ann. Falsif., 3 (1910), No. 16, pp. 61–70*).—The legal, physiological, chemical, and industrial aspects of the use of potassium carbonate in cocoa manufacture are discussed.

Micro-chemical qualitative and quantitative analysis, F. EMICH and J. DONAU (*Monatsh. Chem., 30 (1909), No. 9, pp. 745–757, figs. 3*).—This is a description of methods, particularly of the handling and weighing of small precipitates.

Ultrafiltration methods, R. BURIAN (*Zentbl. Physiol., 23 (1909), No. 22, pp. 767–772, figs. 3*).—This contains a very general description of the various forms of apparatus usually employed for ultrafiltration in colloidal chemical work, and a description, with illustrations, of a new filtering apparatus, designed by the author, which can be employed with and without pressure and at diminished pressure.

The determination of moisture by distillation, S. S. SADTLER (*Jour. Indus. and Engin. Chem., 2 (1910), No. 2, pp. 66, 67*).—The results of a distillation method which employs benzene (boiling point 300 to 450° F.) and of the ordinary oven test with cheese, egg albumen, linseed meal, and sawdust, are reported.

Determination of alkalinity and acidity in soils, K. K. GEDROITZ (*Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 6, pp. 753–781*).—This is a critical study of existing methods, with a description of that employed at the Agricultural Chemical Laboratory at St. Petersburg. The determinations made in this scheme of analysis are total alkalinity, alkalinity due to normal carbonates, bicarbonates, and alkali earth metals, total acidity, and the acidity due to free and combined acids. The soil solutions with the above tests are obtained according to the methods prescribed in Bulletins 18 and 31 of the Bureau of Soils of this Department, previously noted (E. S. R., 13, p. 428; 17, p. 831).

[Report of the] division of fertilizer chemists, American Chemical Society (*Jour. Indus. and Engin. Chem., 2 (1910), No. 2, pp. 70, 71*).—A report of the results of cooperative and comparative analyses of fertilizers for nitrogen, potash, moisture, etc.

Potash tests in commercial fertilizers, J. E. BRECKENRIDGE (*Jour. Indus. and Engin. Chem., 1 (1909), No. 12, pp. 804–806*).—From the results of repeated tests with the official method for potash the author concludes that the method of adding water and boiling renders some of the water-soluble potash insoluble and therefore yields low results. In order to overcome this discrepancy, he recommends the following procedure: Take 5 gm. of the substance on a 11 cm. filter, wash with small amounts of cold water into a 500 cc. flask until the filtrate amounts to about 400 cc., add 5 cc. of hydrochloric acid, bring the mixture to the boiling point, make alkaline with ammonium hydrate, precipitate with ammonium oxalate, filter, and then proceed in the usual manner.

[A test to determine potash in fertilizers containing potassium carbonate], J. E. BRECKENRIDGE (*Jour. Indus. and Engin. Chem., 1 (1909), No. 12, pp. 810, 811*).—The author recommends the following procedure: To 2 gm. of the fertilizer in a 200 cc. flask add 175 cc. of cold water and a few drops of methyl orange, and neutralize with hydrochloric acid. After adding 5 cc. of ammonium hydrate, heat and determine the potash according to the official method.

Remarks on the direct alkalimetric method for estimating phosphates, M. E. POZZI-ESCOT (*Bul. Assoc. Chim. Sucr. et Distill., 27 (1910), No. 8, pp. 775–777*).—The indicators helianthin, dimethyl brown, Congo red, and cochineal can be employed in conjunction with phenolphthalein. The author also points out that the method is not applicable for phosphatic alkaline earths, as a double decomposition takes place with the sodium salt of phenolphthalein.

Estimation of arsenic in copper, E. AZZARELLO (*Gaz. Chim. Ital., 39 (1909), II, No. 5, pp. 450–453, fig. 1; abs. in Analyst, 35 (1910), No. 407, pp. 75, 76, fig. 1*).—The Hollard-Bertiaux apparatus is recommended for determining small amounts of arsenic (0.15 to 0.55 per cent) in copper.

A new method for the volumetric determination of iron, H. BOLLENBACH (*Berg-u. Huttenmänn. Rundschau, 6 (1909), p. 55; abs. in Chem. Ztg., 34 (1910), No. 12, Repert., p. 50*).—The author employs sodium hydrosulphite for reducing the iron sulphate in solution. The reaction is based on the following equation: $Fe_2(SO_4)_3+Na_2S_2O_4+H_2SO_4=2FeSO_4+2NaHSO_4+2SO_2$. Organic acids, nickel, zinc, manganese, chromium, and aluminum do not interfere with the reaction.

Food codex of the Netherlands. I, Milk. II, Food fats and cheese. III, Water, A. J. J. VANDEVELDE (*Rev. Gén. Chim., 10 (1907), No. 21, pp. 372–383; 12 (1909), No. 23, pp. 363–375; 13 (1910), No. 3, pp. 41–55*).—Methods of examination, standards of purity, and similar matters are included in this official code, which was prepared at the request of the Congress of Public Hygiene of the Netherlands.

Coloring matters for foods and condiments, A. BEYTHIEN and H. HEMPEL (*Farben Ztg., 15 (1909), pp. 301, 348, 392, 436; abs. in Chem. Ztg., 34 (1910), No. 14, Repert., p. 58*).—A discussion as to the toxic and nontoxic coloring matters, with special reference to those which are allowable under the pure food law of the United States.

[Judgment of cereals], M. LEVY (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 3, pp. 113–136, pl. 1*).—The author utilizes a micro-chemical method to determine variations in the quality of cereals. This consists of sectioning the cereal, staining the section with Grübler's dry residue of Pappenheim's tri-acid stain, washing with water, hardening with alcohol, clearing with xyol, mounting in Canada balsam, and examining the section with the oil immersion lens. Certain physical and chemical changes are apparent in poor grain.

Numerous ash analyses are appended which were gathered from various sources. Importance is laid on the relation which exists between the potash and phosphorus and the gluten.

Determination of invert sugar in beets, J. URBAN (*Ztschr. Zuckerindus. Böhmen, 34 (1910), No. 5, pp. 287–297, fig. 1*).—In view of the fact that Fehling's solution which contains sodium hydrate has a destructive action on the saccharose during the determination of invert sugar in beets, the author proposes a method in which the sodium hydrate is replaced by sodium carbonate.

A table for the new method is appended. It is further proposed that the extraction of the beets be done with cold instead of hot water, as the latter decomposes a part of the invert sugar.

Determination of the dry matter and starch content of potatoes with the Reimann potato balance, S. HALS and Y. BUCHHOLZ (*Tidsskr. Norske Landbr.,*

16 (1909), No. 7, pp. 303–312).—Comparative determinations of the percentages of dry matter and starch by chemical analysis and the potato balance are reported for 144 samples of Norwegian potatoes harvested during 1907 and 1908.

The results show that in the large majority of cases the balance, with the Maercker table, gave low results for dry matter, the average being 1.38 per cent too low. The percentage of starch in the dry matter increased gradually with the percentage of dry matter in the potatoes, while the nonstarchy components (dry matter minus starch) did not vary greatly, the tendency being toward higher figures for the best potatoes. The average of the nonstarchy substance in 96 different samples was 5.74 per cent. The average dextrose content was 1.28 per cent, with a range from 0.45 to 2.29 per cent, and the cane sugar 0.60 per cent, with a range from 0.11 to 1.03 per cent.

Progress in honey chemistry, A. HASTERLIK (*Leipzig. Bienen Ztg., 25 (1910), No. 2, pp. 22–25*).—A general article on the more recent advances in the field of honey chemistry, particularly with reference to newer reactions for detecting adulterations.

Detection of glucose vinegar, G. DELLUC (*Bul. Trav. Soc. Pharm. Bordeaux, 1909, p. 440; abs. in Chem. Ztg., 34 (1910), No. 14, Repert., p. 58*).—Neutralize 100 cc. of the vinegar with normal sodium hydroxid solution, clear with lead subacetate, and add an excess of saturated sodium sulphate solution. After filtering, fill up to the 200 cc. mark, and determine the sugar with Fehling's solution.

The influence of the method of heating on the nonvolatile ether extract of spices, A. LOWENSTEIN and W. P. DUNNE (*Jour. Indus. and Engin. Chem., 2 (1910), No. 2, pp. 47–49*).—In a comparison of the official method, heating to 110° C. in an air bath, and the vacuum method, heating to 90°, with a mercury pressure of 10 cm., it was found that the differences obtained in actual weight of oil were small and practically due to simple oxidation. The iodin numbers of the extracts, however, differed, that of the vacuum extract being always the higher. Changes in the color and the solubility of the extract were also noticed when heating in the air bath at 110°.

Sulphurous acid in champagne, G. FILAUDEAU (*Ann. Falsif., 3 (1910), No. 16, pp. 58–60*).—Comparative analyses carried out at the central laboratory of the minister of agriculture and the municipal laboratory of Rheims for free and total sulphurous acid in champagne by the French official methods are reported.

Studies in the action of heat on milk, R. R. RENSHAW and F. C. WARE (*Jour. Amer. Chem. Soc., 32 (1910), No. 3, pp. 391–396*).—The authors sought to determine the cause for the difference in results obtained by the gravimetric and optical methods for lactose.

From the results it is evident that alkaline salts have no effect on the lactose of milk when it is heated at 85° C. for some time, and it would seem that the cause lies in bacterial or enzymatic agencies. It was further shown that it is possible to obtain perfectly concordant results between the optical and gravimetric methods, so that utilizing the supposed discordance as a means for detecting pasteurized milk is not reliable.

A new method for detecting pathologic milk, BAUER and SASSENHAGEN (*Med. Klinik, 5 (1909), No. 51; abs. in Tierarzt, 49 (1910), No. 2, pp. 24–26*).—The authors found a positive hemolytic test for milk during mastitis, and propose employing it for detecting milk from diseased animals. Judging from the results obtained the method seems to be very exact.

A rapid and simple method for determining the fat content of cream, L. F. ROSENGREN (*Nord. Mejeri Tidn., 24 (1909), No. 52, pp. 615, 616; K. Landtbr.

Akad. Handl. och Tidskr., *49* (*1910*), *No. 1*, *pp. 71–74*).—This method, originally proposed by M. Weibull (E. S. R., 9, p. 224), involves the determination of the total solids and the calculation of the percentage of fat by difference, it being assumed that the average cream contains 8.7 per cent of fat-free solids. The author suggests determining the total solids (t) by a method similar to that now used for the water content of butter in creameries. About 8 gm. of cream is to be weighed in a small creamery balance and the dish carefully heated over an alcohol lamp, stirring constantly during the operation until the mass assumes a light brown color, when the dish is to be allowed to cool and again weighed. The fat content (f) is calculated from the formula $f=1.1t-9.5$.

The results obtained by this method agree within 0.2 per cent with the gravimetric method. A table is appended showing the percentages of fat in cream corresponding to the different percentages of solids.

Examination of cream, O. Lobeck (*Molk. Ztg.* [*Hildesheim*], *24* (*1910*), *No. 13*, *pp. 215–218*).—A comparative study of methods, with particular reference to the utility of the Sal-method.

The newer methods for testing butter and margarin, J. Prescher (*Pharm. Zentralhalle*, *51* (*1910*), *No. 7*, *pp. 123–127*).—This is a discussion of the newer methods for examining butter, margarin, and mixtures of margarin and butter and other fats. Analyses are appended to illustrate the various points taken up.

A color reaction for butter and lard, C. Reichard (*Pharm. Zentralhalle*, *51* (*1910*), *No. 6*, *p. 107*).—It was observed that when finely powdered copper sulphate was added to melted butter and melted lard the butter assumed the green color of the copper salt and the lard did not. The color became intense on standing after being exposed to the air for some time.

A modified Uffelmann reaction, H. Kühl (*Pharm. Ztg.*, *55* (*1910*), *No. 12*, *pp. 120, 121*; *abs. in Molk. Ztg.* [*Hildesheim*], *24* (*1910*), *No. 16*, *p. 276*).—The author draws attention to the fact that the Uffelmann test also reacts with oxalic, tartaric, succinic, and citric acids. It is proposed to consider it a group reaction and to modify the test as follows: To 10 cc. of a cold saturated solution of salicylic acid add a few drops of ferric chlorid, and then a few drops of the solution to be tested for lactic or the other acids. If these are present a yellow color ensues. The reaction thus modified is much more sensitive than the original one with phenol.

Brewers' grains, M. Gonnermann (*Ztschr. Öffentl. Chem.*, *16* (*1910*), *No. 3*, *pp. 41–45*).—This is a discussion in regard to the identity of the substances in brewers' grains which cause a right-hand rotation. Tests were made with alcoholic and aqueous extracts and the results led the author to conclude that the substance extracted by alcohol is maltose and that that extracted with water is practically erythrodextrin. Special stress is laid on the importance of determining the invert sugar and analyzing according to Clerget's method when examining brewers' grain molasses feeds.

Schaffnit's method for determining impurities in linseed press cake, J. A. Ezendam (*Landw. Vers. Stat.*, *71* (*1909*), *No. 4–5*, *pp. 287–298*).—This is a comparative study between the Schaffnit method,[a] modified by the author, and the Netherland method. It is concluded that the Netherland method is to be preferred.

Estimation of the acidity of apple must, C. Brioux (*Cidre et Poiré*, *1909*, *p. 229*; *abs. in Ann. Falsif.*, *3* (*1910*), *No. 16*, *p. 72*).—Twenty cc. of the must are placed in an alkalimeter and 5 cc. of sodium bicarbonate solution added. From the difference in weight due to the evolution of carbon dioxid the acidity may be calculated as malic acid.

[a] Landw. Vers. Stat., 67 (1907), pp. 51–56.

Quantitative method for fatty acids in fats and oils, K. BRAUN (*Seifenfabrikant, 29 (1909), p. 1140; abs. in Chem. Abs., 4 (1910), No. 3, pp. 392, 393*).—Saponify about 0.5 gm. of the material with 30 cc. of alcohol and 0.5 gm. of potassium hydrate, evaporate off the alcohol, dissolve the residue in 20 cc. of water, neutralize with sulphuric acid, using methyl orange as indicator, transfer the solution to a 200 cc. flask, and add an excess of decinormal silver nitrate. Then add about 10 gm. of sodium sulphate (anhydrous), make the solution up to the 200 cc. mark and filter. To 100 cc. of the filtrate add 5 cc. of iron alum solution (saturated in the cold and treated with nitric acid) and titrate with decinormal ammonium sulphocyanid solution. From this calculate the number of cubic centimeters of decinormal silver nitrate solution used. Each cubic centimeter of this equals 0.001266 C_3H_2 (the theoretical residue left when the fatty acid is subtracted from the fat), and 100 per cent minus the percentage of C_3H_2 equals the percentage of fatty acids. The fats and oils must necessarily be free from chlorids.

The determination of the acid and saponifying numbers of dark fats and oils, F. MARX (*Chem. Ztg., 34 (1910), No. 16, p. 124; abs. in Pharm. Ztg., 55 (1910), No. 20, p. 204*).—A new method is described, as follows: Weigh 2.5 gm. of the fat into a 600 cc. porcelain dish, stir in 50 cc. of neutral alcohol, add 6 to 8 drops of phenolphthalein, and titrate the free fatty acids. Pour the mixture into a 250 cc. flask, washing the residue remaining in the porcelain dish with 20 cc., and then with 10 cc., of pure benzol into the flask. Then add 25 cc. of one-half-normal alcoholic potash solution, boil for ½ hour, pour the solution back into the porcelain dish and with the aid of hot alcohol add 5 to 6 drops of phenolphthalein and titrate back with acid to estimate the unused alkali.

The detection of fish oils in vegetable oils, O. EISENSCHIML and H. N. COPTHORNE (*Jour. Indus. and Engin. Chem., 2 (1910), No. 2, pp. 43–45*).—The authors sought to find a reliable qualitative and quantitative method for fish oil in linseed oil, and found a qualitative test which is deemed entirely suitable for detecting fish oils in admixtures with vegetable oils or similar products. In this, 100 drops of the oil are dissolved in 3 cc. of chloroform and 3 cc. of glacial acetic acid. Bromin is then added slowly to the mixture and after 10 minutes the test tube is placed in boiling water. Vegetable oils clear up, while fish oils remain cloudy. In the case of boiled oils it is necessary to remove the metals before making the test. Linseed oils heated up to or higher than 260° C. do not give the test.

Fat staining methods, P. EISENBERG (*Arch. Path. Anat. u. Physiol. [Virchow], 199 (1910), No. 3, pp. 502–542*).—This is a chemical and techno-histological investigation on the staining of fats in animal tissues.

The significance of the biological detection of vegetable agglutinins and hemolysins, R. KOBERT (*Landw. Vers. Stat., 71 (1909), No. 4–5, pp. 257–261*).—A discussion of the use of these biological reactions for detecting adulterations in vegetable products.

Photochemical formation of formaldehyde in green plants, S. B. SCHRYVER (*Proc. Roy. Soc. [London], Ser. B, 82 (1910), No. B 554, pp. 226–232; abs. in Pharm. Jour. [London], 4. ser., 30 (1910), No. 2419, p. 238*).—The following test serves to demonstrate the production of formaldehyde in plants: To 10 cc. of the solution add 2 cc. of a 1 per cent (freshly made and filtered) phenylhydrazin hydrochlorid solution, 1 cc. of a 5 per cent potassium ferricyanid solution, and 5 cc. of hydrochloric acid. If formaldehyde is present a bright red color is developed.

METEOROLOGY—WATER.

Reorganization of weather forecasting in Russia, P. I. Brounov (*Trudui Selsk. Khoz. Met., 1909, No. 5, II, pp. 1–18*).—The synoptical method of forecasting the weather which, according to the author, is most highly developed in the United States, is only in the incipient stage in Russia. In fact, there is in Russia only one meteorological center, viz., the Chief Physical Observatory at Nikolaiev. There sprang up from time to time in Russia a number of local meteorological centers, but none of them are in operation to-day. The author strongly urges the establishment of an adequate number of local meteorological centers.

Instructions for the establishing of field experimental observation plats at agricultural meteorological stations (*Trudui Selsk. Khoz. Met., 1909, No. 5, II, pp. 69–78, pl. 1*).—The instructions were issued by the meteorological bureau and deal with the selection of a proper plat, its size (maximum about one-half acre, minimum about 0.067 acre), subdivision, manner of cultivation, etc.

How farmers may utilize the special warnings of the Weather Bureau, C. F. von Herrmann (*U. S. Dept. Agr. Yearbook 1909, pp. 387–398*).—This article gives a brief general account of the Weather Bureau and the information it furnishes, and explains the use of special rainfall warnings, frost and cold wave warnings, and storm and flood warnings. Methods of protection of different kinds of crops against frost and cold are described.

The yield of millet (Panicum miliaceum) in dependence upon meteorological factors, I. A. Pulman (*Trudui Selsk. Kohz. Met., 1909, No. 5, I, pp. 6–19, charts 4*).—The field on which these studies were made is situated at 51° 10′ north latitude and 37° 21′ east longitude from Greenwich. The locality is of the steppe character, 221 to 225 meters above sea level, and the soil is a clayey chernozem on loess.

Observations during 10 years led the author to the conclusion that the chief factors determining the yield of millet are temperature and precipitation. During the period from stooling to heading the most important rôle belongs to temperature. This should be from 19 to 22° C. and not lower than 18°, then heading sets at the normal time, 35 to 40 days from the time of sprouting. When the temperature is lower than 18° the heading is delayed 5 to 10 days, probably resulting in a bad yield. During the period of heading the chief rôle is played by precipitation. Failure of precipitation at this time destroys the hope for a good crop. If in the 20 days from the beginning of the heading to the formation of the grain the rainfall is less than 30 mm. the yield will be less than medium.

The influence of meteorological conditions on the growth and yield of oats in the chernozem region, P. I. Brounov (*Trudui Selsk. Khoz. Met., 1908, No. 4, I, pp. 270, figs. 12*).—This report is primarily a digest of the experience of 8 agricultural meteorological stations. It is stated that discussion of the same subject will be continued in a second part of the same volume, in which final conclusions will be drawn.

The general conclusions which now seem to be established are that abundant precipitation (more than 100 mm., 3.94 in.), uniformly distributed throughout the period from sprouting to heading, and a resulting moisture content of from 16 to 18 per cent in the soil to a depth of 25 cm. (about 10 in.), secured a high yield of both grain and straw, and that this was the controlling meteorological factor. A drought, lowering the moisture below the limits mentioned during the first two-thirds of the period named, affected injuriously the yield of straw, but in most cases did not exert any distinct action on the yield of grain. Since the heading took place in the second half of June, the precipitation of June

was important for the yield of both grain and straw; 70 mm. (2.75 in.) was the normal precipitation for the month.

As compared with precipitation, the temperature in the chernozem region appears to be as a rule a secondary factor, although extremes of temperature may occasionally prove fatal to the yield. The mean temperature and the length of the period from seeding to heading exerted a certain influence on the yield of straw. Good yields of grain were obtained under greatly varying mean temperatures and sums of temperature. In general a low mean temperature (5–6° C.) during the period of germination and a moderate mean temperature (11–13°) during the later stages of growth was favorable to the yield of grain and especially of straw. A mean temperature higher than 17° during the period from sprouting to heading affected unfavorably the yield of straw and endangered the yield of grain. A moderate mean temperature during the period from sprouting to heading (15–16°) and its consequent long duration (more than 50 days) were found to be necessary for a good yield of straw; a high mean temperature during this period (18° and higher) and its consequent short duration (less than 45 days) though not injuring the yield of grain, all other conditions being favorable, caused a failure of the straw. Frosts, even when heavy and frequent (to —10° at the surface of the soil) in the first period did no harm, but frosts (to —5°) in the second period endangered the yield of grain. Hot days with mean daily temperatures of 24° and higher and with maximum temperatures of 30° and higher in the interval of time from earing to the milk stage endangered the yield of grain, especially a number of such days in succession. A similar temperature after the milk stage may cause the falling out of the grain.

The relation of the yield of apples to precipitation during 1901 to 1908, K. I. SEMADENI and W. K. GAUER (*Trudui Selsk. Khoz. Met., 1909, No. 5, I, pp. 20–26*).—The observations were made on an estate near the city of Chernigov, 51° 37″ north latitude and 31° 1′ east longitude from Greenwich, and about 150 meters above sea level. The soil is a clay.

During the 6 years under observation good and bad yields of apples alternated. The general conclusions of the author follow: (1) The size of a full crop (good yield) is in direct correspondence with the amount of precipitation during the vegetation year preceding the crop; (2) in like correspondence with the precipitation are the short crops (bad yields); (3) the chief rôle is played by the precipitation during the preceding period of vegetative activity (from the thawing of the soil in the spring to its freezing in the beginning of the winter).

The minimum temperature of the lower layers of the air, T. P. WANGENHEIM (*Trudui Selsk. Khoz. Met., 1909, No. 5, I, pp. 27–35, figs. 3*).—Since the life of a great majority of the field and garden plants is passed between the height of 10 cm. (about 4 in.) from the ground and the surface of the soil the author deemed it very important to study the temperature of this layer of air.

He concludes that immediately over or at the surface of grass (10 cm. from the surface of the soil) there is a considerable lowering of the temperature as compared with that of the air in the instrument shelter at a height of 3.74 meters as well as with that of the surface of the soil on black fallow; at the 10 cm. level the coming of frosts was observed when no freezing could be detected at the other levels. This lowering of the temperature takes place in the evening and night, in the complete absence of dew or other moisture on the plants, and at a time when there is increased radiation, this inclines the author to the opinion that it is due to increased radiation and not to increased evaporation.

Moisture and temperature of the air on mountains and in the free atmosphere, J. SCHUBERT (*Met. Ztschr., 26 (1909), pp. 390–396; Verhandl. Deut.*

Phys. Gesell., 11 (1909), No. 19, pp. 406–414, figs. 2; abs. in Beibl. Ann. Phys., 34 (1910), No. 4, pp. 220, 221).—The use of the dew point in measuring the decrease in moisture with altitude is explained and observations are reported showing a lower temperature and higher dew point on mountains than at the same elevations in the free air.

The question of local showers, N. W. Utechin (*Trudui Selsk. Khoz. Met., 1909, No. 5, I, 44–50, fig. 1*).—By making observations with three rain gages placed at a distance of 4,200 ft. from one another, differences of rainfall amounting to a maximum of 68 per cent of useful precipitation were noted.

Distribution of rainfall, H. Gannett (*Nat. Conserv. Com. Rpt., 1909, vol. 2, pp. 10–12*).—A brief general statement.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. Ostrander and C. M. Damon (*Massachusetts Sta. Met. Buls. 255, 256, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during March and April, 1910. The data are briefly discussed in general notes on the weather of each month.

Meteorology of the year 1908, W. N. Shaw (*Ann. Rpt. Reg. Gen. Births, Deaths, and Marriages, England and Wales, 71 (1908), pp. CXXX–CXXXV*).—The more important meteorological occurrences in the British Isles during the year are described.

Surface water supply of the North Atlantic coast, 1907–8, H. K. Barrows and R. H. Bolster (*U. S. Geol. Survey, Water-Supply Paper No. 241, pp. 356, pls. 6*).—This bulletin gives the results of flow measurements in the drainage basins of the following rivers of the North Atlantic coast: St. John, St. Croix, Machias, Penobscot, Kennebec, Androscoggin, Presumpscot, Saco, Merrimac, Connecticut, Housatonic, Hudson, Passaic, Raritan, Delaware, Susquehanna, Gunpowder, Patapsco, Potomac and Rappahannock.

Surface water supply of the United States, 1907–8. Part XII, North Pacific coast, J. C. Stevens and F. F. Henshaw (*U. S. Geol. Survey, Water-Supply Paper No. 252, pp. 418, pls. 9*).—This report contains results of flow measurements in the following drainage basins: Rogue, Umpqua, Siletz, and Columbia rivers, and Puget Sound.

Water resources of the Blue Grass region, Kentucky; Quality of the waters, G. C. Matson and C. Palmer (*U. S. Geol. Survey, Water-Supply Paper No. 233, pp. 223, pls. 3, figs. 6*).—This report deals with the water resources of an area comprising "about 7,225 square miles in northeastern Kentucky, lying between parallels 38° and 40° north latitude and meridians 83° and 86° west longitude. It includes the major portion of what is commonly known as the 'Blue Grass region,' together with small areas of the more mountainous portions of the State."

In addition to detailed data on water-supply, briefer accounts are given of the geology, physiography, and soils of the region. The classification, distribution, texture, drainage, and chemical composition of the soils are briefly discussed, and it is pointed out that the great value of the soils of this region is due not only to the composition of the rocks from which they are derived, but also in large part to their texture and drainage. Chemical analysis shows that these soils are not only rich in phosphorus, to which their remarkable fertility has been generally attributed, but in other constituents which contribute more or less to their fertility.

[Analyses of well waters], G. R. Patten (*Ann. Rpt. Bur. Sugar Expt. Stas. [Queensland], 1909, pp. 7–11*).—Analyses of the total solids of a large number of samples from the sugar districts of Queensland are reported.

The farmer as an aquiculturist, J. HEYKING (*Deut. Landw. Presse, 37 (1910), No. 22, pp. 250, 251*).—This is a brief discussion of the utilization of small ponds for the production of fish, including a classification of such ponds with reference to their fertilization to increase the growth of suitable food plants for the fish.

SOILS—FERTILIZERS.

Agriculture in the coal regions of southwestern Pennsylvania, H. J. WILDER (*U. S. Dept. Agr. Yearbook 1909, pp. 321–332*).—It is the purpose of this article to call attention to the agricultural value and possibilities of certain little-known districts in this portion of the State.

Two drawbacks to agricultural development in the region are referred to, namely, injury by smoke from coke ovens and the removal of coal near the surface. Nevertheless, there are stated to be important soil areas in this region well adapted to the production of a wide range of products fitted to supply the large demands of the local market. The different soil types which occur and their crop adaptations are described.

Observations of soils of the colony of Eritrea, P. PRINCIPI (*Gior. Geol. Prat., 8 (1910), No. 1–2, pp. 1–34*).—The results are reported of mechanical lithological, chemical, and physical examinations of 3 samples of soil from each of 10 localities in Eritrea, an East African colony belonging to Italy. The soils examined are derived from crystalline schists, granitic rocks, quartz-bearing porphyries, and basalts. In the author's opinion the soils derived from basalts are the most important from an agricultural point of view.

Eight years' soil investigation in southern Illinois, C. G. HOPKINS, J. H. PETTIT, and J. E. READHIMER (*Illinois Sta. Circ. 122, rev., pp. 4*).—In this revised edition of this circular (E. S. R., 20, p. 428) results from 1909 have been added.

Character and treatment of swamp or muck soils, W. P. GAMBLE and A. E. SLATER (*Ontario Dept. Agr. Bul. 178, pp. 39, figs. 13*).—This is a summary of general information on this subject as well as of the results of investigations which have been carried on by the authors for a number of years on certain typical swamp or muck soils of Ontario.

The facts brought out by this inquiry upon which special emphasis is laid are that swamp soils are as a rule very fertile when properly drained and cultivated. The soils experimented with were usually more or less deficient in potash and phosphoric acid and responded readily to applications of commercial fertilizers. Thorough drainage is the first step necessary in the reclamation of these soils.

On account of the absence of nitrifying organisms and the consequent slow conversion of the inert nitrogen into assimilable form the application of barnyard manure or garden loam with frequent cultivation was found to be very beneficial. Liming was found to be an effective corrective for acidity due to the presence of an excess of organic acids. Injurious effects resulting from mineral poisons, such as the lower oxids of iron, were removed by methods of treatment which brought about thorough aeration of the soil. The application of potash and phosphoric acid was found to reduce the lodging of grain and produce better filled heads.

[Sugar cane soils], G. R. PATTEN (*Ann. Rpt. Bur. Sugar Expt. Stas. [Queensland], 1909, pp. 4–6*).—The results of chemical analyses and of determinations of the water capacity of composite samples of soils from the sugar districts of Queensland are reported. As a result of a comparison of the solvent action of 1 per cent solutions of aspartic, acetic, citric, and hydrochloric acids the author

states that "Maxwell's aspartic acid method [E. S. R., 11, p. 507] is considered the most useful, and the one which approximates most closely in showing the amount of the necessary elements available for cane crops."

Action and movements of water in soil, W. P. GAMBLE (*Abs. in Mark Lane Express, 103 (1910), No. 4086, p. 63*).—The various conditions affecting the movement of water in the soil and its utilization by plants are discussed.

The action of commercial fertilizers on percolation of water in soils, E. BLANCK (*Landw. Jahrb., 38 (1909), No. 5–6, pp. 863–869; abs. in Chem. Zentbl., 1909, II, No. 22, pp. 1888, 1889; Chem. Abs., 4 (1910), No. 9, p. 1215*).—In the investigations reported it was found that the addition of kainit, superphosphate, nitrate of soda, sulphate of ammonia, caustic lime, and calcium carbonate to a sandy loam soil containing 10 to 11 per cent of water, at rates of 1 per cent of the soil, decidedly accelerated percolation in all cases except with nitrate of soda, which decreased it. The increases were especially marked in case of superphosphate and caustic lime. In soils containing 1 per cent of water, only the lime accelerated percolation, all other materials decreasing it. With air-dry soils the capacity to retain water was less with all fertilized soils except those receiving lime than with unfertilized soils. Soils treated with nitrate of soda showed the lowest water capacity.

The moisture of the soil, E. VOGLINO (*Coltivatore, 55 (1909), No. 29, pp. 70–75*).—Experiments are reported which show that a dry soil is less favorable to the action of commercial fertilizers than a moist soil.

On the dry soil an application of mineral superphosphate at the rate of 620 lbs., ammonium sulphate 124 lbs., and potassium chlorid 124 lbs. per acre gave an increase of not quite 14 per cent over the unfertilized plat, and the same fertilizers minus the potassium chlorid gave an increase of 9 per cent over the unfertilized plat, but these small increases were obtained at an economic loss of $14.30 and $10.40, respectively. On the moist soil the same applications of fertilizers gave increases over the unfertilized plat of 106 and 97 per cent, or an economic gain of $28.35 and $30.50, respectively.

Determination of assimilable potash in soils, BIÉLER-CHATELAN (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 11, pp. 716–719; abs. in Rev. Sci. [Paris], 48 (1910), I, No. 13, p. 413*).—Experiments with natural prairie soil led to the conclusion that extraction with water containing carbon dioxid affords a measure of the assimilable potash of the soil, this agreeing closely with the results obtained in culture experiments. As a rule such soils containing less than 0.15 to 0.2 parts of potash per thousand parts of soil are appreciably benefited by the application of potassic fertilizers in connection with the necessary amounts of phosphatic fertilizers. In calcareous soils a little less potash is dissolved in the carbonated water than in noncalcareous soils. Contrary to the common belief that clay soils are the best provided with potash, certain light soils were found in these experiments to be particularly rich in this constituent. See also a previous note (E. S. R., 22, p. 220).

The functions and value of soil bacteria, K. F. KELLERMAN (*U. S. Dept. Agr. Yearbook 1909, pp. 219–226, figs. 2*).—This article describes the general character of soil bacteria and discusses the rôle of different groups of bacteria in the soil, the action of nitrifying and denitrifying bacteria, and the fixation of atmospheric nitrogen by bacteria. Attention is called to the need of further research on the interaction of different groups of soil bacteria, and the effect on bacterial activity of methods of cultivation, crop rotation, fertilization, and other methods of handling the soil is pointed out.

The author believes that "by proper methods of tillage, crop rotation, or green manuring, and even by the application of fertilizers, the interaction between prevailing soil conditions and biological phenomena may be modified so as to pro-

mote the activity of desirable micro-organisms and retard the development of the undesirable ones. And as we recognize that bacterial growth is an important factor in the transformation of various materials into available plant food, we appreciate the importance of further investigation for securing more exact and more complete data bearing upon the interdependence of agricultural products and the micro-organisms of the soil."

The bacterial flora as a factor in the unproductiveness of soils, A. DACHNOWSKI (*Ohio Nat., 10 (1910), No. 6, pp. 137–145, figs. 2*).—This is a continuation of investigations previously noted (E. S. R., 22, p. 22) and gives the results of investigations with cultures or organisms obtained from bog water and soils.

Wheat seedlings were grown in solutions inoculated with these cultures and the effect upon transpiration noted. Reduction of transpiration of from 20 to 52 per cent was noted in inoculated cultures.

The author believes that "the results show clearly that the retardation in growth of wheat plants is not caused by physical or chemical conditions but through the direct activity of the bacterial flora. It has long been suspected that a reciprocal relation exists between groups of soil bacteria and the plants growing upon the soil. Various writers have been able to point out that marked differences in the productive power of different soils followed the growth of wild plants, and that these differences persist for some time. It is generally concluded therefore, that the injury caused to cultivated plants by weeds or previous crops might be due to influences on the bacterial life in the soil, and in a direction unfavorable to succeeding agricultural crops. That such relations exist the writer is convinced in view of the evidence presented above. No doubt, the 'exhaustion' of soils which is frequently met with, and which can not always be attributed to the removal of plant nutrients, is, in part, an allied phenomenon."

The balance of life in the soil (*Agr. News [Barbados], 9 (1910), Nos. 202, pp. 17–19; 203, pp. 33, 34*).—This is an article based upon the investigations of Russell and Hutchinson (E. S. R., 22, p. 121), which indicated in general "that the number of bacteria in the soil is limited by the presence of comparatively large, competing and destructive organisms, and that the increased fertility of soils that have been partially sterilized is due to the killing of these and the consequent increase in the rate of production of bacteria, with the concomitant increase in the rate of formation of ammonia."

Gain and loss of nitrogen in cultivated soils, A. KOCH (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 12, pp. 173–175*).—This is a popular account of investigations, a technical account of which has already been noted (E. S. R., 22, p. 428).

Nitrogen-fixing bacteria and nonleguminous plants, W. B. BOTTOMLEY (*Nature [London], 83 (1910), No. 2108, p. 96*).—This is a further short contribution to the controversy on this subject already referred to (E. S. R., 22, pp. 122, 123).

Seasonal nitrification as influenced by crops and tillage, C. A. JENSEN (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 173, pp. 31, figs. 7*).—This bulletin reports the results of investigations on seasonal changes in the water-soluble nitrates in summer fallowed land, wheat land, and corn land down to a depth of 24 in., and the rates and extent of the seasonal removal of the nitrates by these crops, made in connection with cultural experiments on the Bellefourche (S. Dak.) substation of the Bureau of Plant Industry of this Department.

The maximum amount of nitrates was found in the surface 6 in. of the soil in the early part of the spring. Thereafter there was a decrease in the nitrate content of this layer and a progressive increase downward.

"The respective soil layers in the fallow plat reached their individual maximum accumulation of nitrates about a week earlier than the corresponding layers in the wheat plat. . . .

"No evidence could be brought out that the wheat-plant roots drew more heavily on the water-soluble nitrates in one 6-in. soil layer than in any other at any time. . . .

"The corn plants at the end of their most active season of growth had reduced the amounts of water-soluble nitrates in the soil to the same degree of exhaustion as had the wheat plants in the corresponding period of their development. . . .

"The wheat and corn plants reduced the nitrates to a constant amount—about 15 parts per million in the dry soil. The wheat removed the moisture also to a fairly constant degree, namely, about 15 per cent.

"Denitrification, as measured by the nitrites found, could not account for the changes occurring in the nitrate content in the soil layers.

"No correlation could be established between the amounts of nitrates and the air temperature or between the nitrates and the soil moisture.

"Translocation of the nitrates by rain could not account for the seasonal changes in the amounts of nitrates in the different soil layers.

"The general increase and decrease in water-soluble nitrates followed the same course in the fallow plat and in the cropped plats, the only general difference being that there were more nitrates in the fallow plat after May 16 than in the wheat plat."

Denitrification in soils and liquids, A. Koch and H. Pettit (*Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 10-12, pp. 335-345*).—The authors claim that denitrification in soils progresses differently from that in liquids, depending upon the nature of the bacteria and the physical condition of the medium in which they are situated. In liquids and very wet soils from which oxygen is excluded, the bacteria take their oxygen from the nitrates present in the soil and thus liberate nitrogen, but in well aerated soils this does not occur, as the bacteria can then use the oxygen of the air. These denitrifying bacteria remain practically quiescent in soils with a water content below 25 per cent, but when the water reaches 25 to 30 per cent or more they become suddenly active and liberate considerable quantities of nitrogen.

Fertilizing effect of soil sterilization, B. Dyer (*Nature [London], 83 (1910), No. 2108, p. 96*).—Attention is called to the practice followed by large growers of vegetables under glass near London of partially sterilizing their soil by means of steam as giving results on a large scale confirming the conclusions of Russell and Hutchinson regarding the influence of soil sterilization (E. S. R., 22, p. 121).

The fertilizing influence of sunlight, A. and G. L. C. Howard (*Nature [London], 82 (1910), No. 2103, pp. 456, 457*).—The beneficial effects of the practice followed in some parts of India of exposing the soils to the intense heat and light of the hot weather of April and May are also explained on the basis of the investigations of Russell and Hutchinson referred to above.

The fertilizing influence of sunlight, E. J. Russell (*Nature [London], 83 (1910), No. 2105, pp. 6, 7*).—Commenting upon the article noted above, the author suggests the desirability of further investigations to determine to what extent exposure to strong sunlight will bring about partial sterilization and increased productiveness of the soil.

The fertilizing influence of sunlight, J. Aitken (*Nature [London], 83 (1910), No. 2106, p. 37*).—Referring to work by Russell and others, noted above, the author calls attention to an instance of increased productiveness following the heating of the surface soil by a large and long-continued fire.

The action of carbon bisulphid on soils and its use in vineyards, F. Muth (*Separate from Mitt. Deut. Weinbau Ver. Mainz, 1909, pp. 22; abs. in Centbl.*

Bakt. [*etc.*], *2. Abt.*, *26* (*1910*), *No. 8–9*, *pp. 272–274*).—This article explains quite fully the action of carbon bisulphid on the organisms of the soil as shown by the work of various investigators, and gives practical directions for its use in vineyards.

Progress of green manuring for wet lands, H. C. SAMPSON (*Indian Agr.*, *35* (*1910*), *No. 1*, *p. 28*).—The use for green manuring on wet lands in India of sunn hemp, indigo, wild indigo, cowgram, groundnuts, and daincha (*Sesbania aculeata*), is described. It is stated that these plants are especially suited to green manuring because they all have the power of collecting nitrogen from the air.

Investigations on farmyard manure, E. J. RUSSELL (*Jour. Southeast. Agr. Col. Wye*, *1908*, *No. 17*, *pp. 441–447*).—An account is here given of investigations relating to the unavoidable loss in making manure and the value of straw, peat, and bracken as litter. See also previous notes (E. S. R., 17, p. 230; 20, p. 926). The conclusions arrived at are summarized as follows:

"Dung made in a box under bullocks receiving linseed cake and a sufficient amount of litter was found to have lost 15 per cent of its nitrogen during the process of making. Every precaution possible in practice was taken to guard against loss. This result agrees so closely with that obtained by other English and German investigators that it must be regarded as an inevitable part of the process.

"The loss is more serious than it appears, for it falls entirely on the quickly available nitrogen compounds; there is also a further loss since some of these compounds are taken up by micro-organisms and converted into slowly available and less useful substances. We can not suggest any way whereby these losses can be obviated.

"In making dung, peat moss is much better than straw as litter, because of its greater power of absorbing and retaining the soluble nitrogen and potash compounds of the urine. But it decomposes less rapidly in the soil, and on light soils peat moss dung may be less useful than straw dung, especially in dry seasons.

"Bracken is quite a useful material for litter, being nearly as good as straw, but the resulting dung is more useful on heavy than on light soils, because it decomposes less rapidly than straw-made dung."

On the conditions of nitrification in stable manure, B. NIKLEWSKI (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *26* (*1910*), *No. 13–15*, *pp. 388–442*).—Following a discussion of the experiments and theories of various investigators on the action of bacteria in stable manure, the author gives the results of a large number of experiments concerning the conditions of nitrification in both solid and liquid manures.

It is claimed that nitrification occurs in solid stable manure when there is not much liquid manure mixed with it, and that on the first day nitrite bacteria are found in the manure, coming originally not from the stock but from the straw, particles of earth, etc., that stick to the manure. These bacteria increase in number until at the end of 4 weeks there will be 10,000 for 1 gm. of substance. Associated with these were found nitrate bacteria.

Deep stall manure contained nitrite bacteria in very small number, and they were often entirely absent. The nitrite bacteria present found unfavorable conditions for development, chiefly a lack of sufficient oxygen and a high liquid manure content.

Both nitrification and denitrification bacteria seemed to liberate nitrogen under the conditions found in stable manure. It is claimed that a firm packing of the manure and the application of concentrated liquid manure would prove valuable in checking the loss of nitrogen from the heaps. The nitrite bacteria

found in the stable manure were identical with those isolated from the soil by Winogradsky, and which, contrary to the opinion held by some investigators, are able to develop in the presence of fermenting organic matter.

Preservation of manure with a view to suspending and producing heating when desired, GIMEL (*Bul. Soc. Nat. Agr. France, 69 (1909), No. 10, pp. 962–965*).—Investigations undertaken at the suggestion of a practical mushroom grower are reported. The purpose of these investigations was to find some means of arresting fermentation and so taking advantage of favorable conditions for securing a supply of the material and keeping it without deterioration until actually needed.

Comparative tests were made of formol, sulphurous acid, and sulphuric acid. The first two arrested fermentation but it was not possible to remove them and to start up fermentation again when desired. Efficient preservation of the manure was secured by sprinkling it with a solution of sulphuric acid (10 gm. per liter), and active fermentation was readily started in it at any time by neutralizing the acid with a solution of potassium carbonate.

Supplementing manure with fertilizers, A. VIVIEN and E. ROBERT (*Sucr. Indig. et Colon., 75 (1910), No. 13, pp. 296–300; Jour. Agr. Prat., n. ser., 19 (1910), No. 11, pp. 335–337*).—This is a discussion of the kind and amount of manuring which may be reasonably required of tenants by landlords.

The conclusion is reached that during the last 4 years of the lease the requirements should be that the tenant must apply to one-fourth of the farm each year 30,000 kg. per hectare (about 13.3 tons per acre) of manure furnishing 120 kg. of assimilable nitrogen, 60 kg. of assimilable phosphoric acid, and 144 kg. of assimilable potash, or any other green, organic, or chemical manure furnishing like amounts of these constituents. Not more than one-half of the nitrogen should be in mineral form, that is, one-fourth ammonia and one-fourth nitrate.

Summary of results of the Poltava Experiment Field for twenty years, 1886–1906.—II, Cereals, K. T. MANKOVSKI (*Itoghī Rabot Poltavskagho Opuitnagho Polya za Dvadtzat Lyet, 1886–1906.—II, Zernovuie Khlyeba. Poltava, 1909, pp. X+410+144, pl. 1; rev. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 6, pp. 857–864*).—During this period the station gave attention mainly to three lines of work: (1) The time of plowing fallow fields, (2) utilization of manure, and (3) study of varieties, mainly of winter and summer cereals.

It is stated that continued cultivation year after year of the same cereal on the same field gave larger yields of grain and straw than the cultivation of these cereals in a three-course rotation with May fallow.

With respect to the influence of manure some of the general conclusions are as follows: The influence of manure freshly plowed under on the moisture of the soil during the period of fallow can not be considered as favorable. If, however, in wet periods the moisture of the tilled layer of the soil on the manured fallows is the higher, the drying out of the upper layer of the soil on these fallows is more rapid during a period of drought, and about the time of sowing they are dryer than the unmanured fallows. The manure apparently produced no appreciable influence on the moisture of the deeper layers of the soils. It considerably increased the yields of the winter cereals as well as of the succeeding summer cereals, the increase in the latter case being even more marked than in the former.

The composition of commercial fertilizers, M. WHITNEY (*U. S. Dept. Agr., Bur. Soils Bul. 58, pp. 39*).—This bulletin discusses briefly the composition of commercial fertilizers and our present knowledge with reference to their use, and gives extracts from standard works on fertilizers with a summary of guar-

antied analyses of fertilizers for general purposes and special crops sold in various States.

It is stated that notwithstanding the work of the experiment stations on fertilizers " we still have little exact knowledge of the kind of material adapted to different soils or crops or the proportions in which the several ingredients should be combined. . . . There is no rational system of fertilization in general use in this country, and in this respect the United States appears to be far behind some of the European countries."

Referring to the fact that the experiment stations are now giving relatively less attention than formerly to plat experiments with fertilizers, it is stated that " there is yet so much to be learned of the action of fertilizers to establish a rational system that it is very desirable that investigations of this important subject shall be more vigorously pushed in the future, both along the line of field plat tests and along such other lines as may promise valuable results bearing on the theory and practical use of commercial fertilizers."

The general features of the methods of inspection commonly in use are described and their efficiency discussed, emphasis being laid upon the fact that it is impossible by these methods to determine the exact nature of the materials used in the manufacture of fertilizers. It is stated that " the only method by which such information could be reliably placed before the purchasers would be a factory inspection in which the kind and amount of material used in the mixture would be certified on the package and vouched for by the impartial inspector."

The tendency to multiply meaningless special brands of fertilizers is referred to.

Commercial fertilizers and fertilizer inspection, M. WHITNEY (*Nat. Conserv. Com. Rpt., 1909, vol. 3, pp. 108–143*).—The conclusions reached in this study of present systems of fertilizer inspection in the United States are substantially noted above.

New fertilizing materials, R. VALLIER (*Rev. Gén. Chim., 13 (1910), No. 1, pp. 1–11; Amer. Fert., 32 (1910), No. 7, pp. 7–9; abs. in Chem. Ztg., 34 (1910), No. 24, Repert., p. 98*).—This is a summary of investigations relating to calcium nitrate, calcium cyanamid, manganese fertilizers, stimulants and toxic substances, and bacterial fertilizers. The value and possibilities of the new fertilizers are briefly discussed.

Pot experiments with new nitrogenous fertilizers, H. G. SÖDERBAUM (*Meddel. Centralanst. Forsoksv. Jordbruksområdet, No. 25, pp. 18, fig. 1*).—This report summarizes the results of pot experiments begun in 1903 to test the action of calcium cyanamid from different sources on wheat and rye, of calcium nitrate on these cereals and on oats, the influence of mixing oily substances with calcium cyanamid on its value as a fertilizer, and the fertilizing effect of dicyandiamid and dicyandiamidin.

The experiments were made in glazed pots containing 26 kg. (57.3 lbs.) of sandy soil poor in nitrogen and phosphoric acid. The calcium cyanamid and nitrate were compared with sodium nitrate and ammonium sulphate. Check experiments were also made with albumin as a source of nitrogen in order to see whether the conditions for ammonization and nitrification of organic nitrogen were favorable in the pots. The nitrogenous compounds were used at rates furnishing 0.5 and 0.75 gm. of nitrogen per pot, in connection with the necessary amounts of potash and phosphoric acid for maximum crops.

Wheat and rye were found to be much more sensitive to calcium cyanamid than oats. An application of 0.75 gm. of nitrogen per pot in the form of cyanamid showed not the slightest injury in case of oats, but injured wheat and rye to a marked extent even when applied a week before seeding. The injurious

effect was so decided that most of the plants were killed within 4 weeks. On reseeding, however, the plants made a normal growth.

On the basis of increased yield of grain, the calcium cyanamid showed with wheat from 68.2 to 80.2 per cent and with rye from 30.8 to 64.1 per cent of the effect of sodium nitrate. On the basis of total yield, the figures with wheat were from 61.8 to 68.4 per cent and with rye from 44.8 to 66.5 per cent. On the average, therefore, the wheat was more benefited by the cyanamid than the rye.

With oats the increase of yield was from 98.2 to 99.1 per cent of that of sodium nitrate for the grain and from 91.6 to 93.9 per cent for the total yield. The nitrogen content of the straw was uniformly greater with calcium cyanamid than with any of the other forms of nitrogen. Ordinary cyanamid and that impregnated with oily substances gave exactly the same results with oats.

The calcium nitrate was fully equal to sodium nitrate with rye and oats. With wheat, however, especially as regards the yield of grain, it was less effective than the sodium nitrate.

The use of dicyandiamid caused a decided poisoning of oats and reduced the yield below that obtained upon the no-nitrogen pots. Dicyandiamidin produced similar and even more marked results.

The new nitrogenous fertilizers—calcium cyanamid and nitrate of lime, A. D. HALL (*Jour. Bd. Agr.* [*London*], *16* (*1910*), *No. 12, pp. 1006–1008*).—Experiments at Rothamsted comparing mixtures with superphosphate of nitrate of soda, nitrate of lime, sulphate of ammonia, and calcium cyanamid are reported, showing that if there is any difference as regards effectiveness on the Rothamsted soil between these sources of nitrogen it does not exceed 10 per cent. "The Rothamsted soil has no special peculiarity, and suits any of these fertilizers indifferently, but on other soils—very light sands, heavy clays, soils very short of lime—secondary considerations, which do not come into play in these experiments, will make one or other of these fertilizers the preferable manure."

Ammonium sulphate as a fertilizer, H. G. SÖDERBAUM (*Meddel. Centralanst. Försöksv. Jordbruksområdet, No. 26, pp. 17*).—Pot experiments extending over a number of years and comparing ammonium sulphate and sodium nitrate on oats, barley, wheat, rye, carrots, and potatoes are reported. The ammonium sulphate was used at rates of 50, 100, and 150 kg. of nitrogen per hectare (44.6, 89.2, and 133.8 lbs. per acre).

Ammonium sulphate gave the best results in the case of oats, especially when used in connection with bone meal or Thomas slag. Taking the action of sodium nitrate as 100, that of ammonium sulphate varied between 90.8 and 195.8, the variation with ammonium sulphate being as a rule much greater than with sodium nitrate. In the case of barley a mixture of equal parts of sodium nitrate and ammonium sulphate gave better results than sodium nitrate alone, whereas ammonium sulphate as the exclusive source of nitrogen gave much poorer results. With rye ammonium sulphate was somewhat superior to sodium nitrate, but with wheat it was slightly inferior. The two forms of nitrogen were about equally effective on carrots and potatoes.

The modern nitrogen industry (*Engrais, 25* (*1910*), *No. 11, pp. 294, 295*).—This is a note on a report by Guye on the importance of the nitrogen compounds in agriculture, the amounts consumed for this purpose, and the progress which has recently been made in the manufacture of nitrogen compounds from the air.

The nitrogen of the air.—Waterfalls and agriculture, L. GRANDEAU (*Rev. Gén. Chim., 13* (*1910*), *No. 5, pp. 89–92*).—This is a brief account of the history, present status, and future of the nitrate industry of Norway, with notes on the value and use of calcium nitrate as a fertilizer.

Extraction of nitrogen from distillery vinasse, L. VUAFLART (*Engrais, 25 (1910), No. 11, pp. 297, 298; Sucr. Indig. et Colon., 75 (1910), No. 14, pp. 319–321; Betterave, 20 (1910), No. 503, pp. 134–136*).—This article describes briefly the biological process devised by J. Effront (E. S. R., 20, p. 729).

Fertilizer experiments with insoluble phosphates, J. SEBELIEN (*Tidsskr. Norske Landbr., 16 (1909), No. 8, pp. 339–352; abs. in Zentbl. Agr. Chem., 38 (1909), No. 12, pp. 801–804; Jour. Soc. Chem. Indus., 29 (1910), No. 2, pp. 101, 102*).—Pot experiments with oats and buckwheat were conducted by the author during the seasons of 1907 and 1908 with phosphates of different origin applied in connection with sodium nitrate or ammonium sulphate. The effects of 4 kinds of phosphates were compared, namely, superphosphates containing 19.6 per cent phosphoric acid, French Somme phosphate with 28.41 per cent, an Algerian phosphate from Tebessa 26.5 per cent, and Bamble (Norway) apatite 31.54 per cent. The latter 3 raw phosphates were applied in fine ground condition, at the rate of 200 kg. per hectare (178.5 lbs. per acre). The nitrogen was also given at the same rate per hectare, whether in the form of nitrate or sulphate, and all cylinders received in addition a uniform application of potassium chlorid.

In the first season's trials with oats larger crop yields were obtained from all phosphatic fertilizers when ammonium sulphate was added than with nitrate; with buckwheat the same result was obtained except in the case of applications of superphosphate, which gave a larger increase in yield with nitrate than with sulphate. When ammonium sulphate was applied, both the Algerian and French phosphates produced better results than did superphosphate, and the effect of apatite was nearly equal to that of the superphosphate. The second season's trials with oats corroborated in general these results and showed that finely powdered raw phosphates possess a marked fertilizer effect if applied in connection with ammonium sulphate, as has been previously found in experiments by Prianishnikov (E. S. R., 21, p. 722). The second year's trials with buckwheat, in which the soluble salts were added in water solution, instead of being directly mixed with the sand, as in 1907, were absolute failures for the ammonium sulphate series, as no plants appeared in these cylinders. The author states that no satisfactory explanation can be given of this difference with our present knowledge of the subject.

The phosphate deposits of the United States, F. B. VAN HORN (*Nat. Conserv. Com. Rpt., 1909, vol. 3, pp. 558–570*).—Substantially the same information as that contained in Bulletin 394 of the U. S. Geological Survey (E. S. R., 22, p. 227).

Comparative value of ground limestone and burnt lime, S. W. FLETCHER (*South. Planter, 71 (1910), No. 4, pp. 403, 404*).—This is a brief discussion of the relative commercial and agricultural value of these two forms of lime. The author concludes that with the present prices of burnt lime it would be preferable on most soils to use the ground limestone provided this material could be obtained at the farm at a cost not exceeding $1.75 per ton.

Concerning the influence of various relations between lime and magnesia on the development of plants, II, L. BERNARDINI and A. SINISCALCHI (*Staz. Sper. Agr. Ital., 42 (1909), No. 4–6, pp. 369–386; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 567, II, p. 61*).—Already noted from another source (E. S. R., 22, p. 433).

Manganese in agriculture, H. BARTMANN (*Jour. Agr. Prat., n. ser., 19 (1910), No. 4, pp. 115–117, figs. 4; Engrais, 25 (1910), No. 16, pp. 441, 443*).—The various experiments which have been made with manganese as a fertilizer are briefly reviewed.

The action of zinc in pot experiments, P. EHRENBERG (*Landw. Vers. Stat., 72 (1910), No. 1–2, pp. 15–142, pls. 6; abs. in Chem. Abs., 4 (1910), No. 9, p. 1212*).—The work of other investigators on this subject is reviewed and the author reports a series of experiments with mustard, oats, barley, buckwheat, beets, and carrots which he has carried on for several years to determine the effect of zinc on soils and plants, under different conditions and particularly in connection with the use of ammonium sulphate and nitrate of soda as fertilizers.

It was found that soils in poor physical condition were improved by the addition of zinc, the improvement being especially marked when the zinc was used in connection with nitrate of soda. The increased growth of plants which was observed, particularly on soils of high absorptive power, is ascribed to the action of the zinc in bringing about an exchange of bases and in checking the action of harmful organisms in the soil. The injurious effect of the zinc on plant growth, which was observed in some cases, is attributed to corrosive action on the plant roots resulting from an increased formation of hydroxyl ions accompanied by the setting free of ammonia, especially in soils of low absorptive power. It was found that this injurious action was increased by sterilization of the soil and by the use of new zinc pots.

Annual report on fertilizers, B. B. ROSS (*Bul. Agr. Dept. [Ala.], No. 29, pp. 125*).—This is a report of fertilizer inspection in Alabama during the year ended July 31, 1909, with general information regarding fertilizers, the text of the state fertilizer laws, and a brief discussion of the fertilizer requirements of the cotton plant.

Analyses of fertilizers sold in Maryland, H. B. MCDONNELL ET AL. (*Md. Agr. Col. Quart., 1910, No. 47, pp. 32*).—This reports the results of analyses and valuations of fertilizers inspected under the state law from September to December, 1909.

Commercial fertilizers, B. H. HITE and F. B. KUNST (*West Virginia Sta. Bul. 125, pp. 47–102*).—This is the complete report of the fertilizer inspection during 1909. The report of analyses is accompanied by a brief statement regarding the operation of the clause of the state law requiring a guaranty of the quality of the material used in the fertilizers, as well as on the use of lime to correct acidity in sour soils, which are of frequent occurrence in the State.

Report of the agricultural chemist for the year 1908–9, H. H. MANN (*Ann. Rpt. Dept. Agr. Bombay, 1908–9, pp. 50–54*).—A brief account is given of the work of the year, including examinations of waters, soils, manures and fertilizers, foods, feeding stuffs, oils and oil seeds, and miscellaneous products. In the examination of soils and waters particular attention was given to those containing an excess of alkali and the effect of certain of the waters in developing alkali in soils is discussed.

A brief account is also given of the use of "Râb" in the preparation of the seed bed for rice. The process known as "Râb" in India "consists in burning a mass of branches of trees or cow dung on the land where a rice seed bed is to be placed, some time before the rains. It is almost universal in all the trap and laterite regions of western India, where, it is stated, it would be difficult to grow rice without it." The author's investigations indicate that the chief value of this practice lies in the heating of the surface soil, which causes three principal changes, (1) alteration in the number and proportion of the different soil bacteria, (2) the making soluble of a considerable amount of organic nitrogenous matter in the soil, and (3) improvement of the physical condition of the soil.

AGRICULTURAL BOTANY.

Department of botanical research, D. T. MacDougal (*Carnegie Inst. Washington Year Book, 8 (1909), pp. 57–70, pls. 2*).—In addition to the report of the director, in which the routine work of the laboratory at Tucson, Ariz., and the branch laboratory at Carmel, Cal., is described, accounts are given of some of the investigations now being pursued by the staff. These include studies on the alterations in heredity induced by ovarial treatment, the water-balance in succulents, origin of parasitism, growth and alterations in form and volume of succulents, relation of evaporating capacity of the air to plant distribution, activities of plants in tropical rain forests, distribution and movements of desert plants, evaporation and other climatic factors in relation to distribution of plants, physics of transpiration in plants, soil moisture in relation to plant growth, root habits of desert plants, parasitism in desert plants, and inheritance of structural characters in hybrids.

Some evaporation experiments in relation to excessive transpiration, K. M. Wiegand (*Abs. in Science, n. ser., 31 (1910), No. 794, p. 434*).—In order to determine, if possible, the comparative value to the plant of hairy and cutinized coverings, the author conducted a series of evaporation experiments in which cotton or wax was spread over an evaporation surface of saturated blotting paper, the covering being supposed to represent a hairy or a cutinized leaf.

Comparative readings of the loss of water from the variously treated blotting papers in still air and in wind were made, and it was found that evaporation was retarded much more by the wax than by the hair. The efficiency of the hairy covering was much greater in wind than in still air, and even very thin hairy coverings produced a noticeable retarding effect on wind. In sunshine the retarding effect was also marked. From this it is concluded that plants probably make use of waxy coverings when transpiration is to be retarded at all times, and hairy coverings when it is to be retarded only on exposure to strong dry winds and sunshine.

The effect of longitudinal compression upon the production of mechanical tissue in stems, L. H. Pennington (*Rpt. Mich. Acad. Sci., 11 (1909), p. 36*).—The effect of longitudinal compression on woody and herbaceous plants was studied, the material consisting of sprouts and seedlings of locust, aspen, sumac, sunflower, castor bean, and horse bean. In no case did the average of a series of experimental plants show a gain in strength or in mechanical tissue over a like series of control plants.

The response of the guayule, Parthenium argentatum, to irrigation, F. E. Lloyd (*Abs. in Science, n. ser., 31 (1910), No. 794, pp. 434, 435*).—A summary is given of the results of a study of the guayule under irrigation in Mexico for a period of two years.

At the close of two seasons' growth, the irrigated plants showed only minute quantities of rubber, although the growth of the plants was 8 times as great under irrigation as under the ordinary conditions. The plants examined the following April showed a large though not a maximum amount of rubber, and the amount was found to increase as the water of irrigation was withheld. The conclusion is reached that though the rate of secretion is slower in more rapidly grown plants, it may after a drought approach the maximum. It is believed, in view of the total amount of growth, that the total secretion of an irrigated plant is greater in the long run than that of a field plant.

Hail injury on forest trees, F. J. Phillips (*Trans. Acad. Sci. St. Louis, 19 (1910), No. 3, pp. 49–56, pls. 7, fig. 1*).—A report is given of a study of the injury caused by a hailstorm at Hutchinson, Kans., in May, 1908. The effect on a

number of species of trees is described at length and the relative injury to the different species indicated.

The author states that from the two years' observations there seems little doubt that hail injury increases the infestation of hardy catalpa by the dry rot fungus (*Polysticlus versicolor*). It was further found that it reduces the annual wood increment, causing the formation of false annual rings in the species worst affected. Natural pruning of the branches continues for many years after a hailstorm has passed, and such pruning has been noted on branches which had been injured 19 years previously.

The post-mortem blackening of leaves, L. MAQUENNE and E. DEMOUSSY (*Rev. Gén. Sci., 21 (1910), No. 5, pp. 196–203, figs. 3*).—A study has been made of the cause of blackening of leaves after they are severed from the plant, and while this phenomenon is found due to several causes, one of the most common is the action of certain diastases on glucosids in the leaves. While the leaves are living there appears to be no interaction of these substances, but upon the death of the leaves the cell walls appear to become permeable and the change of color rapidly follows.

The intensity of alpine light, F. E. CLEMENTS and F. K. BUTTERS (*Abs. in Science, n. ser., 31 (1910), No. 794, p. 435*).—Readings were made during the summer of 1909 in the Selkirk Mountains, on Mt. Rainier in Washington, and in the Rocky Mountains in Colorado to determine whether mountain regions with higher humidity would reveal greater light absorption. The readings in in the different regions were in close, if not complete, agreement, and indicated that alpine light is little if any stronger than the light at lower altitudes and that it can not be considered an efficient cause of alpine dwarfing.

Action of ultraviolet rays on microbes, P. CERNOVODEANU and V. HENRI (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 1, pp. 52–54; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 3, p. 171*).—A study of the bactericidal action of ultraviolet rays emitted by mercury vapor lamps is reported.

Action of ultraviolet rays on microbes, P. CERNOVODEANU and V. HENRI (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 11, pp. 729–731*).—This is a report of further investigations on the bactericidal action of ultraviolet rays (see above).

On the presence of enzyms in soil, water, and dust, C. FERMI (*Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 10–12, pp. 330–334*).—The methods used in determining the presence or absence of various enzyms in soil, water, and dust are given, together with the results obtained for each case. Gelatinolytic enzyms were more abundant in soil and dust than in water, while coagulant enzyms were found in soil, water, and dust, but only in samples rich in decaying organic matter.

Proteolytic enzyms, amylase, invertase, and amygdalase were not found in any of the samples.

Tests with cultures of root tubercle bacteria, A. J. EWART (*Jour. Dept. Agr. Victoria, 8 (1910), No. 2, pp. 98–105, figs. 4*).—This paper gives the results of tests made with cultures of root tubercle bacteria, such as nitragin, nitro-culture, etc.

The cultures used were purchased in the open market, one being guarantied to contain bacteria for the inoculation of field peas (*Pisum arvense*) and the other for alsike clover (*Trifolium hybridum*). They were tested in the first instance by using field peas grown in sterilized, artificial solutions, in which No. 1 was inoculated, No. 2 uninoculated, and No. 3 inoculated but with no nitrates in the nutrient solution. The peas grown in the uninoculated culture were distinctly larger than in the other two, while root tubercles were found on only No. 1.

In addition to these experiments, 3 small plats were planted with alsike clover and 3 with field peas, and inoculated by mixing the cultures with sterilized skimmed milk and moistening the seeds with this mixture. The results showed conclusively that inoculation did not benefit either the clover or the peas, but rather the reverse. In all the plats tubercles were present on the roots and were as abundant on the uninoculated as on the inoculated.

A third series of experiments was conducted with peas and clover on land which had not grown legumes for a number of years (in some cases 10 years), in which half of the plats were dressed with lime at the rate of 2 tons per acre. Both crops were harvested when the plants were in full flower. A general average of the yields from inoculated and uninoculated plats showed no material results from either inoculation or liming. Selected plants lifted from each plat and compared as to the root system revealed tubercles on all of them, being very abundant and large on the peas, while those on the clover were small, few in number, and brown and shrivelling at the time the examination was made. The author claims as the net results of these experiments that root tubercle bacteria are able to exist in soil for at least 10 years.

In soils containing these bacteria, even if they are not abundant, no appreciable benefit will be derived by inoculating the seed or soil, as the number so added will be trivial as compared with those already present. If after a careful examination of the plants grown on any soil it is certain that tubercle bacteria are lacking, the surest method to obtain them is to inoculate the new soil with 130–300 lbs. per acre of soil from an old field that previously had grown legumes. If this is not available, the root tubercles may be stripped from plants, pounded to a thin paste with water, and mixed with the seed before planting. Nitragin or other nitro-cultures may be used, provided the cultures are fresh and suitable for the particular crop, but this is the most expensive and the least effective method of infecting sterile soil.

New infection experiments with nitrobacterine, nitragin, and soil cultures on blue lupine, H. von Feilitzen (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *26* (*1910*), *No. 10–12, pp. 345–352, figs. 4*).—The results are given of infection experiments with nitrobacterine, nitragin, and soil cultures on blue lupine grown on high moorland under cultivation.

It was found that legumes grown on this type of soil for the first time did not produce satisfactory results, unless they were infected with cultures of tubercle bacteria. Soil cultures from fields which had previously grown legumes produced the surest results and the highest yields. So long as the land had grown a crop of legumes the previous year, the source of the soil cultures was immaterial, soil cultures from vetch and clover land producing satisfactory results on seradella and lupine. The results with nitragin were not so satisfactory as with soil infection, while the nitrobacterine under the conditions was entirely without value.

Mutual interaction of plant roots, J. B. Dandeno (*Rpt. Mich. Acad. Sci.*, *11* (*1909*), *pp. 24, 25, pl. 1*).—In continuation of previous experiments (E. S. R., 21, p. 319) the author has conducted additional investigations on the mutual interaction of plant roots.

It has been noticed that Canada thistles in grain fields were found growing in places where the best grain occurred, and this led to a series of pot experiments in which the effect of the underground system of the Canada thistle on the growth of oats, barley, buckwheat, wheat, and flax was studied. With the oats the thistles seemed to do no harm, but rather tended to increase the crop. The buckwheat showed exactly the opposite result. Twenty-two days after

planting, it was quite clear that the thistles stimulated the growth of oats, barley, and wheat.

Observations were made on corn grown under a poplar and a black locust tree and also about the stump of an oak tree, the tree having been removed about the time the corn was planted. The corn grown about the oak tree stump was very poor, while that under the black locust was almost equal to corn grown in the garden where there was no opportunity for shade.

The fungus symbiosis of orchids, H. Burgeff (*Naturw. Wchnschr., 25 (1910), No. 9, pp. 129–134, figs. 5*).—A summary is given of the present information relating to the symbiosis existing between certain fungi and orchids, together with a description of the author's attempts to germinate orchid seeds with and without cultures of fungi.

The evolution of new forms in Viola through hybridism, E. Brainerd (*Amer. Nat., 44 (1910), No. 520, pp. 229–236*).—The author, who has been studying the species of North American violets for a number of years, has found great variation in them and attributes much of the polymorphism to hybrids occurring between species in the same group. An account is given of a hybrid between *V. affinis* and *V. sagittata* which has been carried through several generations. The plants were found to conform very closely to the Mendelian ratio.

A new form of Nigella damascena obtained through mutilation, L. Blaringhem (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 7, pp. 406–408*).—A description is given of a form of *N. damascena* that is characterized by an abnormal increase in the number of carpels which are arranged in two whorls within the flower. This form is said to have originated in 1907 from plants that had been cut down, and to be readily propagated from seed.

A cristate form of this plant that is said to come true from seed is also noted.

Seeds and plants imported during the period from July 1 to September 30, 1909. Inventory No. 20 (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 176, pp. 34*).—This is a list of the more important seeds and plants secured from various parts of the world during the first quarter of the fiscal year 1910 and contains 329 introductions. Only those which were deemed of especial interest are included, the minor importations being recorded in the office files only.

FIELD CROPS.

On methods in field experiments, M. Egorov (*Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 502–518*).—After a rapid survey of the literature the author observes that as yet no types as regards the size of plats have been established. His own contribution to this question is based on experiments at the Kharkov Experiment Station.

A level field, apparently very uniform and 240 square sazhens in area (11,760 sq. ft.), was divided into 240 square plats (49 sq. ft. in area) on which oats was raised. The yields obtained are considered both as gathered from single small plats and from larger plats resulting from the combination of a number of these plats. The results of these groupings are indicated in the following table;

Mean deviations from the mean yields on plats of different areas.

Area of plats.	Dimensions of plats.	Number of plats.	Mean deviation in yield.	
Sq. sazhens.	*Sazhens.*		*Kilograms.*	*Per cent.*
1	1 by 1	240	0.1489	7.336
3	1 by 3	80	.3487	5.727
5	1 by 5	48	.5279	5.206
10	1 by 10	24	.7691	3.792
	2 by 5	24	.8925	4.400
20	2 by 10	12	1.5830	3.936
	4 by 5	12	1.4410	3.583
40	4 by 10	6	2.2770	2.796
	8 by 5	6	1.8370	2.255
60	4 by 15	4	3.4050	3.420
	2 by 30	4	2.7860	2.799
120	4 by 30	2	6.8400	2.800
	8 by 15	2	.4600	.1883

This and other tables indicate that notwithstanding the apparently uniform nature of the soil, the yields from the single or 1 sazhen plats show considerable fluctuations, the mean yield from a plat being 2.03 kg. and the mean deviation +0.1489 kg., or 7.336 per cent. If the small plats are formed into larger plats the relative deviations decrease with the increase of the plat area. The greater the number of parallel plats the more accurate are the results. The number of parallel plats remaining the same, the larger the plats the more accurate are the results. The total area of the field remaining the same, the larger the number of the plats the smaller the deviation. Accordingly, the same degree of accuracy of experimental results may be obtained on a larger number of smaller plats of a smaller total area as on a smaller number of larger plats of a larger total area.

[Field crop yields and methods of production], A. J. McGuire (*Minnesota Sta. Bul. 116, pp. 385–391, 399–408*).—The yields and methods of production of field crops at the northeast substation in 1908 are reported and discussed with special reference to conditions in northeastern Minnesota.

[Experiments with field crops at Coimbatore], C. J. W. Shepperson (*Rpt. Dept. Agr., Madras, 1908–9, pp. 22–31*).—Cotton planted broadcast produced a greater yield and profit than that which was drilled or that which was deeply plowed. Cotton and millet as a mixed crop produced a greater profit than cotton and horsegram or cotton and coriander.

The fertilization of ragi with cattle manure, ground nuts, white castor, black castor, superphosphate, ammonium sulphate, and nitrate of soda, singly or in combination, produced very little effect. Bed transplantation under irrigation had an advantage over ridge planting. When thinly sown 1 lb. of seed supplied enough plants to transplant an acre, but when sown at the usual rates 4 lbs. were required and the yields of grain were 1,201 and 931 lbs. per acre, respectively.

Results of experiments with wheat, indigo (*Tephrosia purpurea*), and errukam (*Calitropis gigantea*) as green manures for paddy are presented in tabular form. These green manures produced results inferior to those of white castor and black castor, but superior to those of bones with or without ammonium sulphate or nitrate of soda.

Variety and spacing tests with rice are reported. Plants spaced the distance of the closed fist apart produced the maximum yield of 1908–9, but this rate was excelled by single, double, and treble plantings 9 in. apart in 1907–8.

Results of experiments with corn with and without irrigation and when planted on ridges, on the plat, and in beds are given, as well as notes on sugar cane, cowpeas, Kafir corn, and other crops.

Data with regard to the mechanical cultivation of chernozem soils obtained at the Shatilov Agricultural Experiment Station in 1904–5, A. N. Mīservīch (*Khozyaistvo, 1909, No. 8–9; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 538–540*).—The soil at the station is typical steppe chernozem, clayey, 3½ ft. in thickness, and with 10 per cent of humus. Soil of adjacent fields as well as at the station was studied, and early deep plowing compared with ordinary plowing in a fallow-rye-oats rotation without application of fertilizer. Early deep plowing gave more than double the yield produced by shallow late plowing. Manuring and shallow plowing also gave poorer crops than deep plowing without manure.

Report of Bogoroditsk Experiment Field (Government Kursk) for 1907, I. A. Pulman (*Otchet Boghorodtzk. Opuitn. Polya I. A. Pulman, 1907; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 537, 538*).—Late fallow produced the minimum yield of rye, 114 poods per dessyatina (about 1,523 lbs. per acre), while early green fallow fertilized yielded 181 poods. Middle fallow fertilized gave the highest yield of oats, 134 poods, and also of wheat, 105 poods.

Report of Omsk Experiment Field for 1905–6, L. A. Sladkov (*Otchet Omsk. Opuitn. Polyu, 1905–6; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 541, 542*).—On sandy chernozem in a 3 years' test an average increase in yield of rye of 22 poods per dessyatina (293.9 lbs. per acre), or about 25 per cent, followed the use of fertilizer. During the same period, similar treatment appeared to decrease the yield of oats by 11.1 poods per dessyatina. Spring and fall plowing of oats after rye in a 3-course rotation resulted in yields of from 208 to 172 poods per dessyatina, respectively.

Report of Omsk Experiment Field for 1907, L. A. Sladkov (*Otchet Omsk. Opuitn. Polyu, 1907; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 542–544*).—The experiments noted above were continued in 1907. Manure appeared to increase the yield of both winter and summer cereals and spring plowing proved more advantageous than fall plowing for summer cereals.

[Results with cereals at the Experiment Field of Ploti for 1908], A. Karademov (*Ghodīchnuiī Otchet Ploty. Selsk. Khoz. Opuitn. Stantzii, 14 (1908), pp. 52–76*).—Meteorological data given indicate 23 more rainy days in 1908 than in the normal year. General conditions favored wheat production.

The yield of winter wheat on April fallow excelled that on later fallow by 432 kg. per hectare (about 384 lbs. per acre). An application of phosphates showed an increased yield of 1,146.3 kg. per hectare of winter wheat and a residual effect resulting in an increased yield of 677 kg. of corn per hectare, followed by an increased yield of 324 kg. of summer wheat per hectare. With the same phosphates applied in sufficient quantity to supply 29 kg. of phosphoric acid per hectare, there was an increased yield of 518.4 kg. of winter wheat per hectare, and of the summer wheat following, of 166.4 kg. per hectare.

Winter wheat and rye, when grown in a 9-year rotation, increased in yield with the use of 3 leguminous crops, there being an increase of 540 kg. per hectare with sainfoin and a less marked increase with alfalfa. In the same rotation without legumes, they showed no increase in yield. Early green fallow proved more advantageous than late fallow. Field tests verified the results obtained on the plats and indicated the superiority of a 9-year as compared with a 4-year rotation.

Banatka winter wheat on black and April fallows produced net profits of 400 to 480 francs per hectare, respectively. An application of fertilizer resulted in a yield of 3,262.8 kg. per hectare. Oulka summer wheat gave an average profit on 8.8 hectares or 266 francs per hectare, while winter wheat preceding, fer-

tilized at the time of seeding, produced a net profit of 369 francs. A net profit of 277 francs per hectare was obtained from 9.3 hectares of corn, and wheat and oats produced net profits of 125 francs per hectare.

Cultivation of cereals on the Kherson Experiment Field (*Khutoryanin, 1908, No. 8–9; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 578–580*).—Fifteen years data indicate that the influence of fallow is exhausted on the winter crop, and that the occupied fallow is the more profitable.

The influence of manure and of the method and rate of sowing on the yield of cereals at the Kherson Experiment Field (*Khutoryanin, 1909, No. 12; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 561, 562*).—Fourteen years data indicate a negative effect of manure on winter rye and wheat.

The influence of different methods of cultivation on yield, I. D. KOLESNIKOV (*Otchet Opuitn. Polyu. Donsk. Obshch. Selsk. Khoz., 1907; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 533–537*).—This article reports experiments on depth of plowing, method and time of sowing wheat, rye, barley, oats, and flax, and fallow culture.

The kinds of fallow tested with wheat and rye were (1) black fallow turned 7 in. deep in the fall, harrowed in the spring, and plowed again before sowing or about June 1, (2) early green fallow turned at the end of April, (3) middle green fallow plowed during the latter half of May, and (4) late green fallow plowed about June 1. All the green fallows were again plowed early in July, and the third time just before sowing. On the early green fallow, 176.1 poods of rye and 102.5 poods of wheat per dessyatina (2,352.8 lbs. and 1,369.4 lbs. per acre) were obtained, while on late green fallow the yields were 131 poods of rye and 77.9 poods of wheat. Black fallow excelled late green fallow.

Cultivation of root crops, N. MIRUSYEV (*Nuzhdui Derevni, 1908, Nos. 3, 18, 23; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 556, 557*).—The cultivation of beets, carrots, turnips, and parsnips in the Vladimir government is outlined. The average yield of beets is from 1,200 to 1,500 poods per dessyatina (16,032 to 20,040 lbs. per acre).

A protected stock range in Arizona, D. GRIFFITHS (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 177, pp. 28, pls. 6, fig. 1*).—This is a progress report of investigations in cooperation with the Arizona Experiment Station in 1903, and of later cooperative work with neighboring ranches. Earlier results have been previously noted (E. S. R., 16, p. 863).

A brief history of the area since 1903 is followed by a comparison of conditions within and without the fenced area. This season is seldom so dry that *Bouteloua aristidoides* will not produce seed. In an average season the annual plants of the desert produce enough seed to restock the land as heavily as the soils will stand. About 200 species of forage plants, mainly of foreign importation, have been planted in the inclosure, but the net economic result of foreign introduction has been practically nil, alfilerilla (*Eurodium cicutarium*) being the only introduced plant which has succeeded even in the most favored situations. Alfilerilla, wild oats (*Avena fatua* and *A. barbata*), bur clover (*Medicago denticulata*), tucolote (*Bromus maximus*), *Andropogon saccharoides, Bouteloua vestita, B. rothrockii, B. curtipendula, B. oligostachya*, and *Leptochloa dubia* were the principal species experimented with, and where possible one-half the seed was sown in the fall and one-half in the early summer.

Striking changes in the prevalence of annual plants and different seedlings are discussed in cases of *Machalranthera* sp., *B. aristidoides, Aristida bromoides, Plantago fastigiata, Lupinus arizonicus, Orthocarpus purpurascens palmeri, Lotus humistratus*, and *Pectocarya linearis*. The substitution of inferior an-

nuals for the perennials has resulted from overgrazing, and can be reversed by protection from it.

Only 2 weeds have appeared in the inclosure (*Isocoma coronopifolia* and *L. arizonicus*). The latter is supposed to have injured horses but does not appear to be injurious to cattle. The spread of mesquite and other shrubby vegetation has probably been due to the prevention of fires rather than to heavy grazing.

The yields of vegetation on plats of 21 sq. ft. are reported for each year of the test. The best lands appear able to improve under stocking at the rate of 1 bovine animal to 20 acres.

Alfalfa in western Oregon, H. D. SCUDDER (*Oregon Sta. Circ. 6, pp. 7*).—The average alfalfa yield of the station field during the last 8 years has been 6.2 tons of cured hay per acre or 26.3 tons of green feed per acre each year. The general requirements of alfalfa are stated and directions given for the preparation of seed bed, correction of soil acidity, and the seeding, inoculation, and management of alfalfa fields in Oregon.

Barley, L. B. MCWETHY (*Wyoming Sta. Bul. 83, pp. 12, pls. 5*).—Brief descriptions are given of different types of barley. Among the varieties tested in 1909, Primus produced the maximum yield, 2,495 lbs. of grain per acre. The average yield of all 2-rowed hulled bearded barleys was 2,104 lbs. per acre, that of 6-rowed hulled bearded barleys, 2,153 lbs. per acre, that of 6-rowed hull-less bearded barleys, 1,998 lbs. per acre, of 6-rowed hull-less beardless barleys, 2,196 lbs. per acre, and of 2-rowed hull-less bearded barleys, 1,593 lbs. per acre.

Crimson clover: Its rate of gaining nitrogen, C. L. PENNY and MARGARET B. MACDONALD (*Delaware Sta. Bul. 86, pp. 3-42, figs. 2*).—Earlier work of a similar character at the station has already been noted (E. S. R., 16, pp. 967).

It is concluded that crimson clover may gain nitrogen rapidly during the last month preceding its full bloom in some cases, while in others it gains little. Crops which yield much nitrogen a month before full bloom usually gain fewer pounds during the last month than crops poorer in nitrogen at this stage. Approximately, each additional pound of nitrogen at the earlier period reduces the later gain by about ½ lb. A thick close growth favors an early accumulation of nitrogen and a diminished gain later. A sparse open growth tends in the opposite direction and should be allowed to mature for the sake of the probable heavy gain in nitrogen during the last month. Soil that produces a sparse crop will probably profit most from the supply of additional nitrogen.

A fall growth of crimson clover may furnish 50 to 100 lbs. of nitrogen per acre and be profitable even though the crop is winterkilled. The first month's growth in spring usually produces about one-third of the final yield of nitrogen. When hay is removed, 35 to 40 per cent of the total nitrogen of the crop is left in stubble and roots. Although the time required for decomposition is difficult to estimate the roots are thought to yield a considerable amount of nitrate during the first summer, while the tops decomposed more slowly, especially if mature and high in woody fiber.

Corn, C. WILLIS and H. B. POTTER (*South Dakota Sta. Bul. 118, pp. 613-642, figs. 12*).—This bulletin gives suggestions for the growing, selection, and storage of seed corn in South Dakota, discusses seed and market conditions, and gives directions for making a germination test.

Yields and other data are presented for 15 varieties tested at the station during the period 1905–1909. The 5-year averages for Rustler White Dent and Triumph Yellow Flint were 49.2 and 46.9 bu. per acre respectively, and the 4-year averages for Golden Ideal and Minnesota No. 13 were 53.3 and 50.5 bu. per acre respectively.

Indian corn culture, L. A. MOORHOUSE, W. L. BURLISON, and J. A. RATCLIFF (*Oklahoma Sta. Bul. 87, pp. 3–46, figs. 19*).—This bulletin contains directions for corn production in Oklahoma, including suggestions as to seed selection, rotation, fertilizers, preparation of the soil, cultivation, and harvesting. Fifty bu. per acre is taken as the average yield and the cost of production is estimated at $10.23 per acre. An application of 13.4 tons of barnyard manure in February, 1900, apparently increased the average yields during the following 7 years by 9.85 bu. of grain and 0.55 ton of stover per acre. Considerable residual influence from this application appeared in 1906.

Progress in methods of producing higher yielding strains of corn, C. P. HARTLEY (*U. S. Dept. Agr. Yearbook 1909, pp. 309–320, pls. 4*).—This article gives a brief history of work in corn improvement, outlines some of the systems followed, and explains some of the more important principles of corn breeding.

Growing and using corn for ensilage or forage corn, J. H. GRISDALE (*Canada Cent. Expt. Farm Bul. 65, pp. 16, pls. 4, figs. 5*).—This bulletin discusses corn for forage and ensilage in Canada and gives directions for its production, harvesting, storage, and feeding.

Fertilizers for corn soils, M. WHITNEY (*U. S. Dept. Agr., Bur. Soils Bul. 64, pp. 31*).—This bulletin presents in tabular form a compilation of yields of corn on fertilized and unfertilized soils obtained in 6,394 tests reported by the state agricultural experiment stations during the period from 1869 to 1907.

Mixtures of 2 or 3 materials were followed by more greatly increased yields than was the application of a single material, but duplicate check plats varied so widely that all results must be interpreted with considerable latitude. Fertilizers appear to have yielded about the same average increase on the more productive and on the less productive soils. The average cost of fertilizers used in all experiments was $7.06 per acre, and the average increase in crop 9.2 bu. of shelled corn, worth at 60 cts. per bushel $5.52.

The effect of fertilizers applied to timothy on the corn crop following it, T. L. LYON and J. O. MORGAN (*New York Cornell Sta. Bul. 273, pp. 53–76, figs. 8*).—A marked residual effect on corn followed the application to timothy of both natural and artificial fertilizers. Plats which had received fertilizers showed a gain of 35.8 per cent for forage, 25.15 per cent for stover, and 66.65 per cent for ear corn. The increase in ear corn was invariably greater than that in forage or stover. With potassium the ear corn was increased more than with either nitrogen or phosphorus. With a mixture of potassium and phosphorus there was a greater increase in forage and stover than with any other mixture of 2 fertilizers, but the greatest increase in ear corn was with potassium and nitrogen. The maximum increase of forage, ear corn, stover, and timothy followed the application of all 3 fertilizers.

No combination of artificial fertilizers equaled barnyard manure in residual effect. With 10 tons of manure per acre there was an increase of 110 per cent in the yield of ear corn, and the application of 20 tons was followed by an increase of 115 per cent. The increase in stover and forage was smaller but was greater than that following any combination of mineral fertilizers. The applications had been more than paid for by the increased yields of hay, so that the residual effect upon corn was clear gain. The use of 20 tons per acre of farm manure applied twice to timothy, but not to the corn following, produced a gain of $108 per acre in 4 years, while the gain from 10 tons was $72 per acre. The most profitable fertilizer combination produced a gain of $60.85.

Lime had the effect of rendering available plant nutrients in the soil but did not increase the efficiency of the fertilizers. Since the percentage of increase was greater when fertilizers were not applied, the authors regard its

beneficial effect as due to the direct liberation of plant food rather than to its neutralizing or other action.

Experiments with hybrid cottons, J. N. Harper (*South Carolina Sta. Bul. 148, pp. 19, pls. 6*).—This bulletin is a progress report of breeding work with cotton. It outlines the methods used and gives a brief history and statement of the important characteristics of each of the varieties worked with. The maximum yield of 2,469 lbs. of seed cotton per acre was produced by the Ninety Day cotton, an early variety with bolls of medium size.

Some conditions influencing the yield of hops, W. W. Stockberger and J. Thompson (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 56, pp. 12, figs. 2*).—A study was made as to the conditions on an acre of hops in California selected as representative of 600 surrounding acres. This study showed that nonproductive and missing hills reduced "the actual yield to 87.9 per cent of what might be expected of a perfect stand." Individual hills varied in yield from 0.5 to 18 lbs., while the average yield per hill was 6.104 lbs.

"As the number of vines per hill increased, the average yields of the hills having the same number of vines were found to increase in approximately the same ratio. Assuming a full stand of 957 hills with 6 vines trained to each hill, the calculated possible yield is 65.2+ per cent greater than the actual yield on this acre.

"'Bastard' or 'mongrel' hills should be dug out and destroyed, as they are of no value and diminish the total yield."

Field peas, L. B. McWethy (*Wyoming Sta. Bul. 84, pp. 11, pls. 3*).—The climatic and cultural requirements of field peas are stated and directions given for harvesting. In a variety test French June (19389) produced the maximum yield, 21.45 bu. per acre, and ripened earlier than any other variety.

A variety test of potatoes, C. F. Noll (*Pennsylvania Sta. Bul. 98, pp. 3-20, figs. 4*).—The average yields of varieties tested during the period 1906–1909, inclusive, ranged from 48.5 to 181.5 bu. of marketable potatoes per acre. The varieties giving the highest average yields were Six Weeks and Pride of Michigan for the early varieties, Early Puritan and Early Rose for the medium late varieties, and Heath Medium Late Surprise and Whiton White Mammoth for the late varieties. The results of the tests during each of the 4 years are presented in tabular form and descriptive notes are given of some of the varieties.

Planting potatoes, S. Tretyakov (*Khutoryanīn, 1909, No. 14; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, p. 580*).—Larger yields were obtained when the tubers were planted whole than when cut.

Fertilizers for potato soils, M. Whitney (*U. S. Dept. Agr., Bur. Soils Bul. 65, pp. 19*).—This bulletin gives a compilation of yields of potatoes on fertilized and unfertilized soils obtained in 1,769 tests reported by 23 of the state agricultural experiment stations.

Although there was considerable variation in yield of the check plats of the same field there appears to be good chance to obtain an increase in the crop by the application of fertilizers, especially by the application of 2 or 3 substances rather than of a single substance. Little indication was observed of a significant difference in productivity due to different amounts of fertilizers used or of a significant difference in effectiveness of fertilizers on soils of different natural productivity.

In the author's opinion, the data reviewed do not permit a judgment as to the cumulative effect of the continued use of fertilizers for a long period. The results generally indicate a profitable use of fertilizers in growing potatoes.

Influence of fallow culture of the soil on the yield of winter rye, according to results of experiments on the experiment field of the Menzelinsk Agricultural School, P. M. IVANOV (*Selsk. Khoz., 1909, No. 27; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, p. 538*).—Black fallow surpassed early green and other fallows during the two years covered by the observations reported.

The history and distribution of sorghum, C. R. BALL (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 175, pp. 63, figs. 17*).—This bulletin gives a key to the principal groups of sorghum, outlines its present distribution, and states its agricultural and botanical history and nomenclature.

Although it is held that all cultivated sorghums are derived from the wild species *Andropogon halepensis* there are many indications of its independent origin in tropical Africa and in India. The predominating groups in British South Africa are kafirs and sorgos, while in equatorial Africa, the leading types are little known groups related to the durras, and in North Africa only the durra groups are found. India contains a large number of little known or entirely new groups of sorghum. Some are forms of shallu and others approximate the durra group. The kowliangs are a new group found in East China and Manchuria.

A chronological bibliography is appended.

Experiments in sugar-beet culture in the Vilna government, V. IVANOVSKIĬ (*Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4. pp. 484–488*).—Experiments conducted in 1906–1908 in the Vilna government indicate that sugar-beet culture would be remunerative in that section.

Comparative experiments in cultivation of sugar beets after black fallow and after wheat, F. LUBANSKI (*Selsk. Khoz., 1908, No. 31; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 557, 558*).—Tabulated data indicate that superphosphate after black fallow influenced the yield of beets but slightly in either a wet year or a dry year, while after winter wheat its effect was much more marked.

Irrigation of sugar beets, F. W. ROEDING (*U. S. Dept. Agr., Farmers' Bul. 392, pp. 52, figs. 14*).—The furrow, check, border, and subirrigation methods of irrigation are discussed with special reference to sugar beet production, and full directions given for plowing, seeding, blocking and thinning, harvesting, and siloing the crop. The rotation of crops, prevention of crop failures under irrigation, and the economical use of the water supply are also discussed.

Experiments conducted at Loveland, Colo. in cooperation with the Great Western Sugar Company, and at Rocky Ford, Colo. in cooperation with the American Beet Sugar Company, showed in 1906 a higher yield per acre from 0.94 ft. of water applied in 2 irrigations than from larger amounts of water applied in 3 or 4 irrigations. The irrigation of every row by means of lath boxes produced a yield of 1.2 times as great as the irrigation of alternate rows by the same method, and 1.5 times as great a yield as the irrigation of every row by the open furrow method. In 1908, 0. 83 ft. of water applied in 2 irrigations produced the highest purity and sugar percentages, but a lower yield per acre than did larger amounts of water applied in 3 or 4 irrigations. The irrigation of every row resulted in a more economical use of water than the irrigation of alternate rows, and the use of lath boxes saved considerable labor.

Conditions influencing the production of sugar-beet seed in the United States, C. O. TOWNSEND (*U. S. Dept. Agr. Yearbook 1909, pp. 173–184, pls. 3*).—The status and importance of the production of sugar-beet seed in the United States is outlined in these pages and diseases and climatic conditions are discussed in their relations to seed production. Methods of testing, planting, and

cultivating seed beets are given together with directions for gathering, cleaning, curing, and marketing the seed.

The storage of beets through the winter is one of the most serious problems of seed production and a large number of methods of siloing seed beets have been tested, of which the so-called sand method by which the roots are entirely embedded in sand, either with or without the use of a pit or trench, has given the best results. The sand should be slightly moist so that the roots will not wilt. The customary method of piling the beets on the ground without sand or other material between them proved satisfactory from the standpoint of protection from cold when the piles were covered with straw or burlap and sufficient earth to hold these materials in place, provided just enough covering was added to prevent freezing. Difficulty was encountered from heating, however, and still greater loss arose from the attacks of mice upon the crown, destroying the buds and rendering a considerable number of the roots useless for seed production.

Short summary of year's work in tobacco experiments, J. M. VAN LEENHOFF (*Colon. Rpts., Misc.* [*Gt. Brit.*], *No. 64, pp. 18–20*).—Of 22 varieties experimented with for seed purposes, Cavalla cigarette tobacco from Macedonia was the most promising for growth by the small farmers of the region. Under shelter plants grew well, where the subsoil was porous. The leaves were very thin and of a yellowish light green color but the crop was rendered useless by mildew.

The future wheat supply of the United States, M. A. CARLETON (*U. S. Dept. Agr. Yearbook 1909, pp. 259–272, figs. 2*).—The author outlines the increase in acreage devoted to farming and to wheat growing in this country from 1850 to 1900. During this period the total acreage in farms increased from 293,560,614 to 838,591,774, while the acreage of improved lands increased from 113,032,614 to 414,498,487; between 1870 and 1900, the percentage of the total land area of the United States devoted to wheat growing increased from 1 to 2.2. Since 1900, it is estimated that 200,000,000 acres have been added to the farm area of the country, "making the percentage of the total land area in farms approximately 55 per cent." "The present wheat acreage appears to be approximately 4.4 per cent of the farming area, a slightly less proportion than in 1870. By 1950 the proportion should easily reach 6 per cent."

The average yield per acre has increased from 12.31 bu. during the decade ended with 1878 to 13.75 bu. during that ended with 1908. The effect of supply and demand upon the price of wheat, the increase of wheat acreage in the older States, and the probable future of wheat production and consumption are discussed and estimates made on a statistical basis of probable changes in these matters by 1950. A table compares the total land area, the wheat acreage, and the percentage of the total land area in wheat in 20 countries.

According to these estimates a yield of 1,600,000,000 bu. may be expected in this country in 1950, of which 1,400,000,000 bu. may be required for home consumption. Production in foreign countries is expected to keep pace with the increase in population in these countries.

Vegetable seed growing as a business, W. W. TRACY, Sr. (*U. S. Dept. Agr. Yearbook 1909, pp. 273–284, pls. 2*).—The author states that in early times most of the garden seed produced in America was grown by seed merchants, but that now growing of seeds and their marketing are quite as distinct as the manufacture and sale of other merchandise. The growth of the industry is reviewed, its extent and present status outlined, the various elements of value in garden seeds discussed, and a brief account given of each of the principal sources of supply of vegetable seeds.

Some seeds are secured from canneries and from truckers' crops, which could not profitably be sold in the green state, but the larger portion of the

supply is grown by farmers under special contract with seedmen. These contracts differ from those for the manufacture or delivery of most merchandise, because of the possibility that weather and other conditions may prevent their fulfillment. The farmer is cautioned against devoting his whole farm to seed growing and advised to restrict his contract to the growing of a limited acreage.

HORTICULTURE.

Notes and observations on horticulture in America, BUYSSENS (*Min. Int. et Agr. [Brussels] Off. Rural, Avis aux Cult., 2. ser., 1910, No. 6, pp. 23, pls. 12, figs. 7*).—The author made a study of horticultural conditions and practices in the northeastern United States and southeastern Canada. The notes and observations here presented are grouped under the general headings of the culture of cut flowers in the open, greenhouse construction and heating, the floral decoration of public and private gardens, and the methods of horticultural instruction and processes of experiment and research.

Temperature an important factor in horticulture, F. W. MORSE (*Ann. Rpt. Vt. State Hort. Soc., 7 (1909), pp. 58–66*).—This is a discussion of the fundamental principles in the relation between heat and plant growth.

In conclusion the author expresses the opinion that our present knowledge of this subject shows that the development of plants is dependent upon heat. just as chemical action is dependent upon it. "Plants require an optimum temperature for their different phases of life, and these phases are accelerated or retarded in the same proportion that chemical action is modified by heat."

The unheated greenhouse, E. J. CASTLE (*London, pp. VI+20, figs. 24*).—A popular booklet discussing the equipment and management of cold frames, hot beds and cold greenhouses, and giving considerable information relative to various plants suitable for culture therein.

Success in market gardening, H. RAWSON (*New York, 1910, pp. XIV+271, pls. 15*).—This is a revision of the work on the same subject by the author's father, the late W. W. Rawson. Its aim is to present the most up-to-date methods of commercial vegetable culture in the eastern United States.

French market gardening, J. WEATHERS (*London, 1909, pp. XV+227, figs. 57*).—This work, which is designed especially for English growers, contains practical details for the intensive cultivation of vegetables. Part 1 discusses the meaning of intensive cultivation, the history in France and the general principles of intensive cultivation, implements, accessories, etc. Part 2 takes up the special culture of the various market-garden vegetables, and part 3 contains a calendar of operations for the year, together with a plan of a French garden.

Report of investigation of cabbage and cauliflower growing in Canada and the United States, A. MCMEANS (*Ann. Rpt. Ontario Veg. Growers' Assoc., 5 (1909), pp. 60–98, figs. 22*).—This report embodies the results of an investigation into the cultural and marketing methods used by the leading growers in a number of the principal cabbage producing States, including also information relative to the status of the industry in Ontario.

Fall and winter cabbages, C. C. NEWMAN (*South Carolina Sta. Bul. 149, pp. 3–11, figs. 5*).—The subject matter of this bulletin has been previously noted from another source (E. S. R., 22, p. 640).

Cultural experiments with cabbage in 1909, HUBER (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 16, pp. 224–231, figs. 5*).—Tabular results are given of cooperative variety tests of cabbage conducted under the direction of the German Agricultural Society in 1909, including data showing the relative value of the different varieties for making sauerkraut.

Thousand headed kale, H. D. SCUDDER (*Oregon Sta. Circ. 5, pp. 4*).—Popular directions are given for growing this crop, including a discussion of soil, seeding, transplanting, feeding, summer kale, and seed selection.

Growing tomatoes for early market, J. W. LLOYD and I. S. BROOKS (*Illinois Sta. Bul. 144, pp. 47–88, figs. 17*).—This bulletin describes somewhat in detail the cultural and marketing methods employed by commercial tomato growers, together with the results of cultural and other experiments conducted at the station.

Some tests were made in 1908–9 to determine the influence of the age and character of the plants on their yield of early fruits. From these tests it appears that large, well-grown plants are essential to the production of large yields of early tomatoes, and that the production of a heavy crop early in the season does not impair the vigor of the plants enough to affect seriously the yield of late fruits. The results of 4 years' fertilizer tests indicate that a mixture of steamed bone, dried blood, and potassium sulphate was superior to the various other fertilizers used. Pruning tomato plants to single stems reduced the yield of both early and late fruit, exposed the fruits to sun scald and cracking, and did not materially increase their size. Staking tomatoes without pruning, however, increased the yield of marketable fruit over that of untrained plants. As a result of a 5 years' test, it was found that the leaf-spot of the tomato (*Septoria lycopersici*) can be controlled by spraying with Bordeaux mixture.

[Vegetable and fruit culture in northeastern Minnesota], A. J. MCGUIRE (*Minnesota Sta. Bul. 116, pp. 408–413, fig. 1*).—Brief suggestions are given relative to the kinds of vegetables and fruits suitable for culture in northeastern Minnesota.

Vegetable seed investigations, E. B. EDDY (*Ann. Rpt. Ontario Veg. Growers' Assoc., 5 (1909), pp. 57–60*).—A table is given summarizing the results with the principal kinds of vegetable seeds tested by the Dominion seed inspectors during the past 3 years. The number of samples tested, average germination, standard germination, and percentage of variation from the standard are indicated.

Storage of vegetables, J. W. WELLINGTON (*Ann. Rpt. Vt. State Hort. Soc., 7 (1909), pp. 47–53*).—This paper discusses methods and devices for the home storage of vegetables.

Promising new fruits, W. A. TAYLOR (*U. S. Dept. Agr. Yearbook 1909, pp. 375–386, pls. 7*).—This consists of historical notes with descriptions and colored plates of the following little known or new fruits which are suggested as promising for trial: Mother and Coffman apples, Carrie gooseberry, Winfield raspberry, Diploma currant, Victor roselle, and the Bradley, Claremont, Halbert, Mobile, and Daisy pecans.

Fruit tree planting in Montana, R. W. FISHER (*Montana Sta. Bul. 77, pp. 3–35, figs. 7*).—The purpose of this bulletin is to outline the methods of cultivation and irrigation practiced in the fruit producing valleys of Montana, and to indicate the best methods of culture and the varieties best suited for the home orchard. The bulletin concludes with an estimate of the cost of starting and maintaining a 10-acre orchard for a period of 8 years.

Fruits recommended for planting in Ontario (*Ontario Dept. Agr. Bul. 179, pp. 20*).—This bulletin consists of general and district lists of fruits recommended for planting in various parts of the provinces of Ontario after careful tests of varieties made at the various fruit experiment stations and by experienced growers.

Report of the fruit expert, W. J. ALLEN (*Rpt. Dept. Agr. N. S. Wales, 1909, pp. 20–25*).—This consists of notes on the condition of various deciduous and

citrus fruits being grown in the departmental orchards, including financial statements for the year.

Investigations on the root growth of fruit trees, GOETHE (*Jahrb. Deut. Landw. Gesell., 25 (1910), No. 1, pp. 61–72, pls. 8*).—Results are given of examinations made of the root systems of different kinds of fruit trees. The work is discussed under the general headings of the characteristic root development of different fruit trees, the conditions influencing root development, and the relation of root diseases to tree sickness.

Notes on the time of blossoming of fruit trees, C. H. HOOPER (*Jour. Bd. Agr. [London], 17 (1910), No. 1, pp. 32–38*).—This consists of notes for the season of 1909 relative to the blossoming period of different varieties of orchard and small fruits, the data being based on records made at the Wye Agricultural College at Kent and at other points in England.

Prevention of frost injury to fruit crops, G. B. BRACKETT (*U. S. Dept. Agr. Yearbook 1909, pp. 357–364, pl. 1, fig. 1*).—The author briefly reviews the experimental work conducted along this line, including the use of explosives, smudges and heating devices, and gives illustrations of the successful employment of heating devices in western orchard sections, including data relative to the cost of equipment and maintenance. He concludes that the abundance of testimony is sufficiently ample to warrant the statement that the prevention of frost injury to fruit crops has passed the experimental stage and has become a well established fact.

Investigations on the causes of premature dropping of fruits, G. BELLAIR (*Rev. Hort. [Paris], 82 (1910), No. 8, pp. 182–184, figs. 4*).—The author briefly reviews various causes of premature dropping of fruits and indicates remedies for the trouble.

The handling of deciduous fruits on the Pacific coast, A. V. STUBENRAUCH (*U. S. Dept. Agr. Yearbook 1909, pp. 365–374, pls. 3*).—This paper contains practical suggestions relative to the preparation for shipment and marketing in fresh condition of such fruits as apples, apricots, cherries, peaches, pears, plums, nectarines, grapes, and small fruits. The subject matter, which is based upon the fruit shipment and storage investigations of the Bureau of Plant Industry (E. S. R., 20, p. 1037) is discussed under the following headings: Transportation problems, handling, packing and marketing, mechanical injuries, and refrigeration including precooling.

Picking and packing citrus fruits, M. J. IORNS (*Porto Rico Sta. Circ. 8, Spanish ed., pp. 4–19, figs. 2*).—The English edition of this circular has been previously noted (E. S. R., 21, p. 239).

Fruit growing, storage, and marketing in the United States, N. KAUMANNS (*Jahrb. Deut. Landw. Gesell., 25 (1910), No. 1, pp. 80–91*).—This has been noted from another source (E. S. R., 22, p. 734).

Preliminary observations on the adaptability of native varieties of grapes of Piedmont as scions for grafting on American vines, C. SANTE (*Bol. Quind. Soc. Agr. Ital., 15 (1910), No. 8, pp. 326–329*).—The observations are based on experiments conducted at the Alba school of enology and consist principally of notes on the character of grafts made between a number of native grapes and various American species and hybrids.

Review of phylloxera and of the American vines, C. GRIMALDI (*Rivista [Conegliano], 4. ser., 16 (1910), Nos. 5, pp. 97–103; 6, pp. 121–124; 7, pp. 145–150; 8, pp. 169–173*).—This consists of a report to the Italian Agricultural Society of an investigation into the failure of a number of American and French grape stocks used in reconstituting the vineyards of Sicily. As reported in a similar investigation by A. Ruggeri et al. (E. S. R., 22, p. 448) the phylloxera does not appear to be the principal cause of the failure, many of the vines

apparently suffering from lack of affinity between stock and scion, unfavorable soil and cultural conditions, etc.

The experimental vineyards of the Lausanne Viticultural Station, H. FAES (*Terre Vaud., 2 (1910), Nos. 15, pp. 169–171; 17, pp. 193, 194*).—A descriptive account of these vineyards is given.

Olive culture, materials and processes of making oil (*Cong. Leitaria, Olivicult. e Indus. Azeite 1905, Relat. Geral, II, pp. 752, pls. 8, figs. 5*).—This volume consists of reports on olive culture and various phases of oil manufacture presented to the Congress of Dairying, Olive Culture and Oil Manufacture, held in Lisbon in 1905.

The following themes are considered: Olive culture in Portugal, varieties of cultivated olives, diseases of olives, period of maturity, harvesting, sorting and washing the fruit, the preserving of olives, the influence of heaping the fruit on the quality of edible oils, grinding olives, the materials and processes of crushing and their influence on the quality of edible oils, materials and processes of expressing olives, decanting, washing and filtering the oils, utilization of the bagasse, oil extraction by chemical processes, bottling the oil, plans and models of oil presses, cooperative oil mills, schools for training in mill work and stations for studying oils, methods of promoting the olive oil industry, the commerce in oil in Portugal, the decline of the industry through the importation of foreign oils, oil merchants, agricultural credit applied to the oil industry, and control against frauds

Pineapple culture in Porto Rico, J. M. TURNER (*Weekly Cons. and Trade Rpts.* [*U. S.*], *1 (1910), No. 11, pp. 487–490*).—A brief general account of the pineapple industry in Porto Rico, including information relative to the cost of culture and returns from the crop in different districts of the island.

The citrus grove, its location and cultivation, P. H. ROLFS (*Fla. Quart. Bul. Dept. Agr., 20 (1910), No. 2, pp. 81–96*).—This article contains concise information relative to the character of the Florida soils, the selection of a site for citrus groves, preparing the land, methods of culture, and building up a neglected grove.

Tea in Jamaica, H. E. COX (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1910), No. 3, pp. 176–181, pls. 2*).—This consists of a brief account of the history of tea culture in Jamaica, the conditions under which the industry is being developed, cultural details, and the preparation of the leaf for use.

The graftage of chestnuts, J. FABCY (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 20, pp. 592–595*).—The author points out the importance of grafting as a means of checking the ink disease of chestnuts and gives suggestions relative to methods of grafting.

Manual of floriculture, A. BUYSSENS (*Manuel de Floriculture. Vilvoorden and Paris, 1909, pp. 362, figs. 264*).—This is a guide to the culture of flowering plants and shrubs in the open and under glass. It discusses general cultural operations, soils, fertilizers, greenhouse management, and gives descriptive and cultural notes of the more important indoor and outdoor flowers, ornamental plants, and shrubs.

Gardens and gardening (*Lowell, Mass.: City Library [1910], pp. 23*).—A list of books relating to gardens and gardening in the Lowell City Library.

FORESTRY.

Silviculture, H. J. A. DITTMAR (*Der Waldbau. Neudamm, 1910, pp. 279*).—This work is offered as a guide for instruction and practice as well as a manual for the private forest owner. In part 1, introductory considerations deal with the various forest types, climate and soil, the development of pure and mixed

stands, natural and artificial reproduction, and the maintenance of the stand. Part 2 takes up the various deciduous and coniferous trees relative to their special characteristics, cultural requirements and treatment.

The arboretum of the Royal High School of Agriculture, Horticulture, and Forestry at Wageningen, J. V. SURINGAR (*Meded. Rijks Hoogere Land, Tuin en Boschbouwsch., 3 (1910), No. 2–5, pp. 119–213, pls. 3*).—This consists of a short review of the nature and history of dendrology and of the literature, nomenclature, and origin of our tree species, together with a list of species growing in the arboretum which includes botanical names and synonyms, geographic distribution and other notes.

Increment investigations with spruces, USENER (*Allg. Forst u. Jagd. Ztg., 86 (1910), pp. 122, 123*).—Comparative tables are given showing the diameter and volume accretion of some 243 firs and 133 spruces examined in the community forests of Ranrupt and Colron-la-Roche in Alsace-Lorraine.

Soil physics investigations in mixed stands of oak and beech, R. WALLENBÖCK (*Centbl. Gesam. Forstw., 36 (1910), No. 4, pp. 151–156*).—Results are given of a series of investigations conducted in oak and beech stands to determine the relation between the kind of soil cover and the physical character of the soil.

The author concludes that the physical character of forest soils is influenced by the kind of tree in the stand and its accompanying soil cover. The dead soil cover found underneath pure beech stands increased the water capacity of the soil in a much greater measure than the vegetative soil cover found underneath pure oak stands. Loamy soils in pure beech stands are favorably influenced by the action of the leaf mold cover to a depth three times as great as in an oak stand. Where oaks and beeches grow in a mixed stand, the greater the percentage of beech trees the greater the water capacity of the soil.

The results of similar investigations along this line are also noted.

The effect of the forest upon waters, P. BUFFAULT (*Rev. Eaux et Forêts, 48 (1909), Nos. 1, pp. 1–18; 2, pp. 33–44; Amer. Forestry, 16 (1910), No. 3, pp. 151–173*).—This consists of a summary of the results of European investigations relative to the influence of the forests upon stream flow and upon the sources of water, including a review of this question as discussed at the Congress of Navigation held at Milan in 1905.

The opportunities in forest planting for the farmer, A. S. PECK (*U. S. Dept. Agr. Yearbook 1909, pp. 333–344, pls. 4, fig. 1*).—In this article the author points out the necessity for utilizing the farm woodlot to the best advantage and of establishing new forests on treeless areas, both for protection and as a commercial proposition. Suggestions are given relative to the methods and species by which this may be best accomplished in the different sections, including data on what has already been done along this line by the Government, State, and private individuals.

Basket-willow industry, F. DILLINGHAM (*Weekly Cons. and Trade Rpts. [U. S.], 1 (1910), No. 11, p. 491*).—This consists of notes on the character of the basket-willow industry in the Bavarian district of Upper Franconia.

[Forest resources in Maryland], B. N. BAKER, W. B. CLARK and E. HIRSCH (*Rpt. Conserv. Com. Md., 1908–9, pp. 119–135, pls. 2, fig. 1*).—In addition to a brief survey of the forest resources of the State, this report discusses wasteful methods of lumbering, forest fires, the farmer's woodlot, the use of the forests and the relation of forests to stream flow, concluding with suggestions for the development and conservation of the woodlands in the State.

Forest conditions in South Carolina, W. M. MOORE (*Dept. Agr. Com. and Indus. [S. C.] Bul. 1, pp. 54, figs. 7*).—This report embodies the results of a

preliminary examination of forest conditions in South Carolina made by the State and the Forest Service of the U. S. Department of Agriculture. It consists of a general description of the region surveyed, information relative to the timber supply and output of the State, descriptions of the forests by regions, discussions of grazing and forest fires, conservative lumbering and turpentining, farm wood lots, taxation, forest planting, and the influence of deforestation upon streams, and recommendations for the preservation of the forests and streams.

Forest conditions in Sweden, C. Metzger (*Allg. Forst u. Jagd. Ztg., 86 (1910), pp. 115–122*).—A descriptive account of forest conditions and operations in Sweden.

Annual administration report of the forest department of the Madras Presidency for the twelve months ending June 30, 1909 (*Ann. Admin. Rpt. Forest Dept. Madras, 1909, pp. 96+CXXXII+12*).—This is the yearly progress report relative to the constitution, management and administration of the state forests in the northern, central and southern circles of the Madras Presidency, including financial statements for the year. The data relative to areas, progress in forest survey and working plans, routine administration work, forest products, revenues, expenditures, etc., are appended in tabular form.

DISEASES OF PLANTS.

Vegetable pathology, H. Tryon (*Ann. Rpt. Dept. Agr. and Stock [Queensland], 1908–9, pp. 112–122*).—This is a report on the various diseases of agricultural, orchard, and garden crops, in which much space is given to a discussion of the discovery in Queensland and Tasmania of the late blight of the potato (*Phytophthora infestans*) and the probable source of its introduction, together with laws and remedies to check its further dissemination in Australasia.

The principal fungus diseases of the year, T. W. Kirk (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 76–86, pl. 1*).—This is a report of the various diseases found on cultivated plants in New Zealand in 1909. Special note is made of the death of fowls caused by eating wheat badly affected with stinking smut (*Tilletia tritici*).

Turnips suffered severely from a bacterial rot attributed to *Bacillus oleraceæ*, which is claimed to be mainly carried by insects. An unknown species of Phoma is also reported to be causing great destruction to blackberries.

Injuries to cultivated plants in Reuss, F. Ludwig (*Phytopath. Ber. Biol. Centralstelle Reuss, 1909, No. 5, pp. 10; abs. in Ztschr. Pflanzenkrank., 20 (1910), No. 2, pp. 83, 84*).—A general summary of fungus, insect and weed pests of grain, forage, truck garden and orchard crops, and forest trees for 1909.

Some fungi from Ossola, A. Noelli (*Malpighia, 23 (1909), No. 3–4, pp. 171–184, fig. 1*).—This is a list of some 47 species of fungi, mainly parasitic, from the valley of Ossola, of which *Mollisia fagicola* on the leaves of the beech (*Fagus sylvatica*) is described as new.

The loose smut of oats and stinking smut of wheat and their prevention, J. C. Arthur and A. G. Johnson (*Indiana Sta. Circ. 22, pp. 15, figs. 9*).—Descriptions are given of the loose smut of oats and the stinking smut of wheat and suggestions offered for their prevention, the method advised being the sprinkling of the seed when spread on the floor with a solution of about 1 pt. of formalin to 50 gal. of water, after which the grain is thoroughly shoveled over so as to distribute the moisture evenly. About 1 gal. of this solution is required for 1 bu. of oats or 2 bu. of wheat.

The control of the loose smuts of barley and wheat, O. APPEL (*Illus. Landw. Ztg., 30 (1910), No. 15, p. 126, fig. 1*).—This is a popular discussion of the principles underlying the methods of combating these grain smuts, together with a description of a modified hot-water treatment for their control.

Studies on the toxicology of Diplodia zeæ, H. S. REED (*N. Y. Med. Jour., 91 (1910), No. 4, pp. 164–169, figs. 2; abs. in Science, n. ser., 31 (1910), No. 794, p. 437*).—An examination of the literature dealing with the etiology of pellagra is said to show great diversity of opinion as to the identity of the fungi held responsible for the deleterious property of the affected maize. The author calls attention to the recent spread in this country of *D. zeæ*, which was almost simultaneous with the appearance of pellagra. The fungus is said to be present in European countries where pellagra is found, and recent studies have shown that it lives parasitically upon the growing maize as well as saprophytically on the mature grain.

Chemical and physiological experiments on the properties of maize infected with Diplodia are in progress, and the physiological experiments have shown that such maize is toxic to small animals. The author has been able to isolate from meal infected with Diplodia a product which seems to resemble the pellagrozein isolated by Lombroso.

The pests and diseases of New Zealand Phormium, T. W. KIRK and A. H. COCKAYNE (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 286–289, pls. 9*).—This is a summary of the fungus and insect enemies of the New Zealand hemp (*P. tenax*), in which the characteristics and distribution are given of surface mildew (*Cladosporium* sp.), leaf spot and black smut, which are caused by fungi not yet definitely identified, rust (*Melampsora* sp.), and root fungi, several of which destroy the roots of Phormium, notably a species of Fusarium which especially attacks young plants.

Studies on the potato fusaria, O. APPEL and W. WOLLENWEBER (*Mitt. K. Biol. Anst. Land u. Forstw., 1909, No. 8, pp. 17–19*).—This is a brief summary of our present knowledge and theories concerning the part that species of Fusarium is supposed to play in producing certain diseases of the potato.

The blackleg of the potato, D. HEGYI (*Ztschr. Pflanzenkrank., 20 (1910), No. 2, pp. 79–81; Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 6, pp. 347, 348*).—This is a brief discussion of the probable infection of healthy potato plants by means of wireworm injuries or other wounds on the underground parts of the plants and the subsequent spread of the bacteria throughout the potato from this infection point.

The leaf-roll disease of potatoes, O. APPEL and W. KREITZ (*Mitt. K. Biol. Anst. Land u. Forstw., 1909, No. 8, pp. 15–17*).—A brief review of the life history, methods of control, and theories as to the cause of this disease, is given.

Notes on seed potatoes, F. PARISOT (*Bul. Mens. Off. Renseig. Agr. [Paris], 9 (1910), No. 1 pp. 21–24*).—The cause of the diseased condition noted in a previous article (E. S. R., 19, p. 735), wherein seed tubers after winter storage are soft, with the surface shriveled and dried, and with small eyes and slender sprouts, is claimed to be due to an intoxication or poisoning produced by the action of the carbon dioxid arising from the respiration of the tubers themselves while in storage. As means of prevention, storage at low temperatures and the elimination of the carbon dioxid from the storage rooms are recommended.

Leaf diseases of the celery (*Jour. Bd. Agr. [London], 16 (1910), No. 12, pp. 1010, 1011, fig. 1*).—General descriptions of the characteristics and means of dissemination of two leaf diseases (*Phyllosticta apii* and *Septoria petroselini*) are given. As a preventive measure, spraying with half-strength Bordeaux

mixture on the first appearance of either disease and continuing at intervals of a week until three applications have been made is suggested.

The brown rot of the tomato, C. K. Bancroft (*Jour. Bd. Agr.* [*London*], *16* (*1910*), *No. 12, p. 1012*).—This is a well-known disease in portions of England in which the fungus attacks the fruits only. An infected fruit first shows discolored patches which as the disease progresses run together so that the whole surface becomes discolored while the pulp is reduced to a dark-colored mass. Seeds from infected fruits are of a darker color than normally, because of the presence in the endosperm and embryo of fungal hyphæ which appear to be the hyphæ of *Phytophthora omnivora*. These infected or "brown seeds" are capable of germination and are reported to produce plants which always bear infected fruits.

Diseases of trees, L. Savastano (*Patologia Arborea Applicata. Naples, 1910, pp. XI+666*).—This is an elaborate treatise on the common diseases of trees infecting Italian forests and orchards. The author divides the subject into 5 general divisions as follows: (1) Biology of trees, (2) constitutional diseases, (3) bacterial diseases, (4) parasitic diseases, both fungus and insect, and (5) meteorological diseases and silviculture. The work closes with an extended bibliography of Italian literature on diseases of forests and orchards, especially those of grapes, olives, and citrus fruits. Separate indexes are also appended for hosts and parasites.

[Investigations on crown gall, peach yellows, and other orchard diseases], J. L. Phillips (*Rpt. State Ent. and Plant Path. Va., 7* (*1908–9*), *pp. 56–98, pls. 8, figs. 5, maps 2*).—This paper gives the results of investigations on crown gall of the apple, peach, quince, dwarf pear, dwarf peach, and raspberry; on peach yellows, peach rosette, little peach, and peach leaf curl; and on anthracnose and rusts of the currant, raspberry, and blackberry.

After giving the life history of crown gall of apples and the results of various experiments and observations on the nature and dissemination of this disease, the author concludes that crown gall is a bacterial disease which is transmitted to nursery trees by the use of seedlings affected by the hairy root form of the gall and by the use of scions from trees with roots diseased with crown gall. These are the two main sources of infection, although crown gall will also spread from tree to tree in the nursery row. Nurserymen, therefore, should carefully inspect all seedlings used in propagating apple trees and destroy every one that shows the slightest trace of hairy root and also cut their scions from healthy trees. The lower end of a seedling that is diseased should not be used, even though this lower part is not apparently affected with hairy root, for the disease is in the sap and this lower part will transmit the disease almost as certainly as the upper part. Experiments conducted by the author show in some cases as much as 100 per cent of trees diseasesd with crown gall where scions had been cut from trees affected by this trouble, even when they were inserted into apparently healthy seedlings.

It has also been shown in experiments with thousands of trees that the disease may be reduced as low as from 5 to 10 per cent in the nursery by rejecting diseased seedlings and scions from diseased trees. Fruit growers are advised to demand absolutely clean-rooted, healthy trees which have grown in the nursery for 3 years free from the disease, for they can be more certainly depended upon to produce healthy trees than younger stock, as the bulk of this disease does not show up until the third year.

Remedial treatment, such as the heavy applications of lime, fertilizers, etc., has not proved effective in controlling this disease in the nursery, but on the contrary often causes severe injury and in some cases has resulted in the death of trees thus treated. This is true not only of nursery stock, but all orchard

trees treated with heavy applications of fertilizers, etc., have shown similar injury.

Until more is known about the peach crown gall, the author advises the same precautions for it as for the apple gall.

In regard to crown gall of the dwarf trees and of the quince, no recommendations are made, as a large proportion of such trees are affected by the disease in the nursery and further experiments must be made to ascertain what injury is produced before the fruit grower will be justified in destroying such trees because of the hairy root form of the crown gall found on them.

After noting the characteristics of and damage done by peach yellows, peach rosette, little peach, and peach leaf curl, the author sums up the results of experiments and observations on the peach yellows as follows: Peach yellows has now reached the main peach sections in the United States, down almost to Georgia and Alabama, and is generally prevalent in orchard and seedling trees along roads, hedges, etc., but does not seem to have reached the peach sections of the far West. It is transmitted by peach pits and by buds from diseased trees to the nursery. From the nursery it is carried to the orchard, where it is able to spread from one orchard to another. Control must be begun by the nurseryman getting healthy peach pits and healthy scions for propagating purposes. As the disease seldom shows up in the nursery row, it is necessary to keep careful data on young orchards to find out what nurseries are distributing diseased trees.

In experiments with buds from diseased trees, the trees that grew as healthy as any in the nursery developed the disease the following year in the orchard in more than 90 per cent of the trees. The disease does not spread very quickly in the orchard, as trees may stand in close proximity to diseased trees for 3 or 4 years without showing symptoms. Buds from diseased trees inserted into orchard trees produce yellows on these trees very quickly, usually within 12 months' time. The disease can be readily controlled in the orchard, if orchardists will plant healthy trees and see that all orchards in their vicinity, as well as their own, are systematically inspected and the diseased trees promptly destroyed. It does not seem desirable to replant orchards where diseased trees have been removed after they are 4 years old.

Notes on Sclerotinia fructigena, J. B. POLLOCK (*Abs. in Science, n. ser., 31 (1910), No. 794, p. 437*).—It has been held by some European authors that the species of Sclerotinia attacking stone fruits in the United States is *S. cinerea* and not *S. fructigena*, as has been generally assumed. Studies have therefore been made of material collected at various places and compared with reports of various workers in Europe and the United States.

The apothecia found in Michigan as well as in other parts of the United States agreed very closely with *S. fructigena* as found in Europe. In the United States the species occurs more commonly on stone fruits, while in Europe it is most common on pome fruits.

The author believes that in all probability the species described as *S. fructicola* is identical with *S. fructigena*.

The control of peach brown rot and scab, W. M. SCOTT and T. W. AYRES (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 174, pp. 31, pls. 4, fig. 1*).—A report is given of 3 years' demonstrations and experiments with self-boiled lime-sulphur mixture for the control of peach brown rot (*Sclerotinia fructigena*) and peach scab (*Cladosporium carpophilum*). The experiments were begun in 1907, continued on a larger scale in 1908, and in 1909 the treatment was demonstrated on a block of more than 5,000 trees.

The author states that if self-boiled lime sulphur is properly prepared and applied there is very little danger of injury to the fruit or foliage. There is

a possibility, however, of staining the fruit if the mixture is applied within 2 or 3 weeks of the ripening period. On this account it is recommended that the last application be made not later than 4 weeks before the ripening period.

Where curculio is present arsenate of lead at the rate of 2 lbs. to 50 gal. of water may be used, the first spraying to consist of this insecticide, and to be followed in 2 or 3 weeks with a combination of lime sulphur and lead arsenate, and a month later with the lime sulphur alone. Where the curculio is not troublesome the arsenate of lead should be omitted, but 3 or 4 weeks after the petals fall the trees should be sprayed with the self-boiled lime sulphur. This should be followed with 2 applications, one in 3 weeks and the last about a month before the fruit is expected to ripen.

For scab alone one treatment of the lime sulphur applied about a month after the petals drop will nearly control the disease, but if there is a possibility of an epidemic a second spraying may be applied in 3 or 4 weeks.

The peach leaf curl, A. MANARESI (*Coltivatore, 56 (1910), No. 7, pp. 208–211*).—This is a brief discussion of the nature and methods of dissemination of this fungus, together with the results obtained by using various fungicides in attempts to control the disease.

The control of the apple scab, F. FISCHER (*Ztschr. Pflanzenkrank., 19 (1909), No. 7, pp. 432–434; abs. in Rev. Patol. Veg., 4 (1910), No. 7, pp. 97, 98*).—The author concludes after several years of attempts to control this disease (*Fusicladium dendriticum*) that there are no varieties of apples absolutely immune, as some which are apparently resistant one year may be attacked the next season.

The fungus usually invades the fruit through injuries to the epidermis, which permit the entrance of the germ tubes. The infection depends on the condition of the weather. Cool nights alternating with warm days are favorable for the dissemination of the fungus, especially if these conditions occur at the time of seed formation in the young apples. In the spring before the leaves open is recommended as the best time for the first application of Bordeaux mixture.

A leaf disease of the cherry, E. MARRE (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 4, pp. 121–123; Bul. Mens. Off. Renseig. Agr. [Paris], 9 (1910), No. 1, pp. 24–27*).—In certain provinces of France a serious leaf disease of the cherry has already materially decreased the yield and threatens to become widespread. It was identified as *Gnomonia erythrostoma*, a well-known fungus in Austria and Germany. The general characters of the disease are given and remedies suggested, such as burning the infected leaves in the fall and the use of Bordeaux mixture to check its spread in the spring.

The ascogenous form of the grape Oïdium, V. PEGLION (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 18 (1909), II, No. 10, pp. 488–491*).—Attention is called to the discovery during November in the vicinity of Ferrara of perithecia associated with *Oidium tuckeri*. The perithecia belonged to *Uncinula necator* and it is claimed that this is probably the ascogenous form of the common grape Oïdium.

An epidemic of Spumaria on strawberries, L. MANGIN (*Rev. Hort. [Paris], 81 (1909), No. 24, pp. 568, 569, figs. 2*).—The prevalence of *S. alba* on the stems and leaves of strawberry plants, producing an unsightly appearance and probably injuring the formation of fruit, is noted, together with a general description of the myxomycete and its development on the strawberry. Spraying with a potassium sulphid solution 3:1,000 is recommended.

Fungus diseases of the maguey, G. GANDARA (*Mem. y Rev. Soc. Cient. "Antonio Alzate," 25 (1908–9), No. 9–12, pp. 293–305, pl. 1, figs. 8*).—Descriptions and hosts are given for three well-known fungi parasitic on the maguey (*Agave americana*), namely, *Colletotrichum agaves*, *Coniothyrium concentricum*, and

Plowrightia agaves. A discussion follows of the characters, prevalence, and damage done by fungi not hitherto reported on these plants, these being *Thielavia* sp., *Trichothecium roseum*, *Phytophthora agaves*, and two Hymenomycetes. One of these which seems to belong to the Thelephoraceæ causes serious losses to growers of the Tequila maguey by forming rosy-colored areas on the bases of the leaves, which gradually invade the entire plant and kill it. The other Hymenomycete is a species of Panus which attacks the bases of the leaves of *A. americana.*

The article concludes with suggestions for combating these fungi.

A new disease of coffee, F. C. von Faber (*Teysmannia, 21 (1910), No. 1, pp. 60–62*).—The author calls attention to a new disease of coffee, which resembles *Rostrella coffeæ* in its gross characteristics on the stems and branches of the coffee plants. Cross sections of the diseased wood show, however, that the fungus extends from the tops of the branches into the roots, forming dark brown areas on the wood beneath the bark which as the disease progresses may appear as brown or black spots on the bark of the affected trees.

Cutting down the trees, as is done in combating the Rostrella fungus, will not control this disease, because the roots are also invaded. The only safe remedy is to dig up and burn the entire plant.

Outbreaks of the oak mildews in Hungary, J. Roth (*Naturw. Ztschr. Forst u. Landw., 7 (1909), No. 8, pp. 426, 427*).—The prevalence and severity of this disease during 1908 are noted for 4 provinces in Hungary. Attention is also called to the fact that other plants besides oaks suffered from mildew attacks that year, indicating that unusually favorable conditions existed for the propagation of mildews in general.

The rusts of the pine and the parasitic occurrence of Cenangium abietis, E. Schaffnit (*Vorträge Pflanzenschutz, Abt. Pflanzenkrank. Kaiser Wilhelms Inst. Landw. Bromberg, 1910, No. 1, pp. 69–79, figs. 4*).—After a brief notice of parasitic fungi in general, the author discusses the characteristics, prevalence, and hosts of 4 coniferous rusts, namely, *Melampsora pinitorqua*, *Peridermium pini*, *Chrysomyxa abietis*, and *C. ledi.*

Attention is also called to the occurrence in 1909 of *Cenangium abietis* as a parasite on the Scotch pine, causing the death of shoots on trees 5 to 50 years old.

The leaf-fall diseases of the pines and their control, R. Schander (*Vorträge Pflanzenschutz, Abt. Pflanzenkrank. Kaiser Wilhelms Inst. Landw. Bromberg, 1910, No. 1, pp. 33–42, figs. 10*).—The author describes the characteristics of the various fungi which cause the needles of pines and other conifers to fall prematurely, and discusses the effects of Bordeaux mixture when used in combating them. The following species are claimed to produce this premature shedding of the needles: *Lophodermium pinastri*, *L. macrosporum*, *L. abietis*, *Hypoderma strobicola*, *H. laricis*, and *H. sulcigena.*

Corticium javanicum in Borneo (*Agr. Bul. Straits and Fed. Malay States, 9 (1910), No. 2, pp. 59, 60*).—This disease of rubber trees was especially severe in 1909 during the monsoon period.

The first appearance of the disease on the trunks of the Para rubber trees is characterized by small drops of latex issuing as if from punctures in the bark. Soon black patches appear which gradually increase in area. Beneath the dead bark are found pads of foul smelling rubber. Then the pinkish fungus of *C. javanicum* makes its appearance and completes the destruction of the trees. On the branches, the disease appears as small raised spots of cork scattered about, which eventually split and become small black sores. When these become numerous, the whole of the cambium and all but the outer bark layer are dark brown and rotten and the characteristic pink fungus appears.

The progress of the disease is checked by tapping, burning, and tarring. Old wounds and rough places on the bark seem to afford an easy entrance to the fungus, so these should also be tarred.

A parasite occurring in the latex of Euphorbia pilulifera, A. LAFONT (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 22, pp. 1011–1013*).—Attention is called to a disease of this ornamental Euphorbia which causes a premature shedding of its leaves. On examining the affected tissues, a species belonging to the group Flagellatæ was found infesting the latex of the attacked plants. The organism is described as *Leptomonas davidi* n. sp.

Some parasitic fungi on greenhouse plants, E. GRIFFON and A. MAUBLANC (*Bul. Trimest. Soc. Mycol. France, 25 (1909), No. 4, pp. 238–244, pl. 1*).—The authors discuss 4 diseases of hothouse plants, of which *Pestalozzia clusiæ* on the leaves of *Clusia* sp. and *Phyllosticta dracænæ* on Dracæna leaves are described as new. Codiæum plants were found to be injured by two fungi, *Glœosporium sorauerianum*, which is claimed to be identical with *G. crotonis*, and *Asteroma codiæi*, a violet-colored fungus associated with the Glœosporium on the stems and limbs of the Codiæum.

A carnation disease, H. BLIN (*Rev. Hort. [Paris], 82 (1910), No. 5, p. 104*).—This is a brief discussion of a leaf disease of carnations due to the parasitic fungus *Heterosporium echinulatum*, which is said to have caused much damage during 1909 in various portions of France both to outdoor and hothouse plants. Various fungicides are recommended as means of combating the disease.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Darwin and modern science, edited by A. C. SEWARD (*Cambridge, 1909, pp. XVII+595, pls. 5, figs. 12*).—A collection of 28 essays in commemoration of the centenary of the birth of Charles Darwin and of the fiftieth anniversary of the publication of the origin of species, of which the following are of special interest to zoologists: The Value of Color in the Struggle for Life, by E. B. Poulton (pp. 271–297), and Geographical Distribution of Animals, by H. Gadow (pp. 319–336). See also a previous note (E. S. R., 22, p. 776).

The animals of Australia. Mammals, reptiles, and amphibians, A. H. S. LUCAS and W. H. DUDLEY (*Melbourne, 1909, pp. XI+327; rev. in Nature [London], 82 (1910), No. 2103, p. 453*).—While this work is intended primarily for the general reader the arrangement and treatment are throughout thoroughly scientific. Many of the illustrations are taken from original photographs.

Private game preserves and their future in the United States, T. S. PALMER (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 72, pp. 11, pls. 2*).—This circular discusses the history and present status of private game preserves in this country and the outlook for the future.

National bird and mammal reservations in Alaska in charge of the U. S. Department of Agriculture (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 71, pp. 15, maps 8*).—The executive orders setting aside these reservations are presented, together with maps which show the exact territory embraced in each. These reservations, established in February and March, 1909, comprise, with one exception, small islands along the coast of Alaska and in the Bering Sea, and are known respectively as Bering Sea, Fire Island, Tuxedni, Saint Lazaria, Yukon Delta, Pribilof and Bogoslof reservations. "Fire Island is the breeding ground of the Alaska moose, the islands in Bering Sea contain rookeries of sea lions, and all of the reservations are important breeding grounds of sea birds or ducks and geese."

Pocket gophers as enemies of trees, D. E. LANTZ (*U. S. Dept. Agr. Yearbook 1909, pp. 209–218, pls. 3, fig. 1*).—It is stated that pocket gophers inflict losses

fully as great as those caused by either rabbits or field mice. They are widely distributed, inhabiting more than half the entire territory of the United States outside of Alaska and the island possessions, and also northwest Canada and Mexico, whence their range extends southward to Costa Rica.

Of the 9 genera, Geomys, Cratogeomys, and Thomomys occur within the United States. All have similar food habits and are exceedingly destructive to plant life, injuring field crops, gardens, and trees. Their burrows prevent close mowing, admit surface water, and on sloping ground lead to the washing of deep gullies. Their tunnels in dams and levees cause many costly breaks.

It is stated that in southern California the roots of the fig tree and apricot seem to be most subject to attacks, but orange, lemon, almond, apple, pear, and all other orchard trees of the region, except the peach, are also injured, as well as nursery stock. In the open forests of Georgia, Florida, and Alabama the gophers live almost entirely upon tree roots, but their injury is not serious. It is said that soft crown gall occurs frequently on roots injured by gophers and mice.

The methods of destroying pocket gophers described include poisoning, trapping, flooding, and fumigation. "If but few pocket gophers are to be destroyed, there is little choice between traps and poisons as the means to be used. If, however, the animals are numerous or distributed over large areas, poisoning is by far the quickest as well as the cheapest method." Helps in combating gophers are found in several natural enemies, including the barn owl, great blue heron (*Ardea herodias*), badgers, weasels, wildcats, coyotes, skunks, and snakes. The importance of cooperation in combating the gopher is emphasized.

Rats and petroleum, H. MANDOUL (*Arch. Par., 12 (1909), No. ɔ, pp. 451–455*).—The author finds rats to have a particular aversion to petroleum

A hand-list of the genera and species of birds, V, R. B. SHARPE (*London: Brit. Mus. Nat. Hist., 1909, pp. XX+694; rev. in Nature [London], 82 (1909), No. 2094, p. 183*).—The fifth and last volume of this work (E. S. R., 16, p. 234).

Introduction of the Hungarian partridge into the United States, H. OLDYS (*U. S. Dept. Agr. Yearbook 1909, pp. 249–258, pl. 1*).—An account of the nature and habits of the Hungarian or gray partridge (*Perdix perdix*), some 40,000 of which were transplanted from the game covers of Europe to those of America during the years 1908–9.

"While most of the reports received of these various colonization experiments with the Hungarian partridge are favorable, persons interested should not be too sanguine of ultimate success. . . . The Hungarian partridge may never satisfactorily adapt itself to conditions in this country; or it may develop objectionable traits. Hence it would seem wise to devote less energy and money to the establishment of this and other exotic species and give more attention to the restoration and maintenance of our native game birds."

Plants useful to attract birds and protect fruit, W. L. MCATEE (*U. S. Dept. Agr. Yearbook 1909, pp. 185–196*).—The main purpose of this article is to call attention to the plants which best serve to provide food for birds and to draw their attention away from cultivated crops. The plants that are useful in different sections of the country for attracting fruit-eating birds and protecting cultivated fruits, as well as food plants for sparrows and upland game birds, are described.

"Nothing surpasses mulberries for alluring birds away from the early orchard fruits. Early bearing varieties should be planted in numbers and some should be selected for the length of the fruiting season. . . . Where it is desired to attract birds and afford them a sanctuary at all seasons, a large variety of plants must be used. For this purpose thickets of shrubs and other

low growths are better than trees, since tangles of bushes and vines afford a more secure retreat from bird enemies and are the favorite cover of many species. Where birds occur in large numbers their enemies are sure to congregate. Hence grounds especially designed to attract birds should also be furnished with devices to insure security from cats and other predatory animals."

A trypanosome of a field mouse (Microtus arvalis), A. LAVERAN and A. PETIT (*Compt. Rend. Soc. Biol.* [*Paris*], *67* (*1909*), *No. 37*, *pp. 798–800*, *fig. 1*).—A trypanosome found in the blood of a field mouse, obtained from the department of Seine-et-Oise, France, is described as representing a new species to which has been given the name *Trypanosoma microti.* The species appears to be nonpathogenic.

Note on the mode of multiplication of Piroplasma bovis as observed in the living parasite, G. H. F. NUTTALL (*Parasitology*, *2* (*1909*), *No. 4*, *pp. 341–343*, *dgm. 1*).—This account of observations of the mode of division of *P. bovis* and the character of its amœboid movement in fresh blood is illustrated graphically by a diagram, composed of figures selected from a series of sketches made while watching the live parasite under the microscope.

The cultivation of Piroplasma equi, E. J. MARZINOWSKY (*Ztschr. Hyg. u. Infektionskrank.*, *62* (*1909*), *No. 3*, *pp. 417–422*, *pl. 1*).—A brief review of the cultivation of protozoa is given. The author finds *P. equi* to develop in a 10 per cent solution of chemically pure sodium citrate. Developmental forms were found to appear on the second day and a culture was kept alive for 30 days. By transference to of fresh media the parasite was kept until the third generation.

Observations on Theileria parva, the parasite of East Coast fever of cattle, G. H. F. NUTTALL, H. B. FANTHAM, and ANNIE PORTER (*Parasitology*, *2* (*1909*), *No. 4*, *pp. 325–340*, *figs. 4*, *charts 2*).—The authors here report observations that were conducted upon the blood of 2 cows experimentally infected by means of ticks (*Rhipicephalus evertsi*), from South Africa.

"Summarizing our observations on the living parasite, we would state that they show active movements within the corpuscles and at times undergo alterations of form. No structural details can be made out in living parasites. We have not obtained any conclusive evidence that the parasites multiply within the infected corpuscles, but at times appearances were observed suggesting this possibility. In several cases the parasites seemed to grow slightly in size during the period of observation. When infected corpuscles lost their hemoglobin the parasites were distinctly seen for a time, after which they degenerated and died. The escape of parasites from infected corpuscles was witnessed on six occasions; it was accomplished without injury to the corpuscle. On two occasions the escaped parasites appeared to reenter fresh corpuscles."

The life cycle of Herpetomonas jaculum, parasitic in the alimentary tract of Nepa cinerea, ANNIE PORTER (*Parasitology*, *2* (*1909*), *No. 4*, *pp. 367–391*, *pl. 1*, *fig. 1*).—The complete life history of this apparently nonpathogenic parasite is given for the first time. Most of the common water scorpions (*N. cinerea*) obtained from the southeast of India were infected with it. The occurrence of a new species of Herpetomonas (*H. vespae*) in the alimentary tract of a hornet (*Vespa crabro*) is also recorded.

A handbook of microscopical technique as related to investigation of the protozoa, S. J. VON PROWAZEK (*Taschenbuch der mikroskopischen Technik der Protistenuntersuchung. Leipsic, 1909, 2. ed., pp. 87; rev. in Parasitology, 2* (*1909*), *No. 4*, *p. 436*).—A second enlarged edition,

Practical microscopy.—An introduction to microscopical methods, F. S. Scales (*London, 1909, 2. ed., pp. XVI+334; rev. in Nature* [*London*], *82* (*1909*), *No. 2096, p. 245*).—A second revised and enlarged edition.

The southern plum aphis, C. E. Sanborn (*Oklahoma Sta. Bul. 88, pp. 3–8, figs. 5*).—The southern plum aphis (*Aphis setariæ*) appears annually on plum trees in Oklahoma and unless controlled by natural means or by insecticides practically destroys the plum crop. The new growth of the affected tree is distorted, the leaves being more or less corrugated and crumpled together on the lower surface. The terminal bud is stunted and its growth is sometimes abruptly terminated. Many of the blossoms are often killed, and in cases where the infestation is severe early in the season, no fruit is set.

Early in the spring the so-called stem mother hatches out from the egg, in which stage it has passed the winter. Reproduction then takes place at a rate of 2 to 5 young per day for a period of 3 or 4 weeks. These young attain their growth in a week or 10 days and also reproduce rapidly. Winged forms develop which disperse and found new colonies. Early in the summer when the terminal branches have nearly completed their season's growth and the leaves have become toughened by age, dispersion becomes most pronounced.

At this time the aphids commence to establish colonies on certain species of grasses, namely, Canadian blue grass (*Poa compressa*), crab grass (*Panicum sanguinale*), goose grass (*Elusine indica*), redtop (*Tridens seslerioides*), yellow foxtail (*Chætochloa glauca*), nimble-will (*Muhlenbergia schreberi*) and *P. polyanthes*. When noticed upon grass they are often seen to be attended by ants, such as *Solenopsis debilis*, *Minomorium minutum*, and *S. geminata*.

The latter part of October the winged form, known as a migrant, arises from the grass colonies and locates on the plum tree, there to found a new colony. The descendants of these migrants differ greatly in function from their spring and summer predecessors, from the fact that there are sexual forms, and the females are oviparous instead of viviparous. When the oviposition is completed, which is usually by the middle of November, the aphids die.

It is recommended that lime-sulphur wash be used at any time after the eggs have been deposited in the fall and before the buds commence to swell in the spring. Tobacco sprays are recommended for summer use. Lady beetles are considered the most important of the natural enemies.

The oyster-shell scale and the scurfy scale, A. L. Quaintance and E. R. Sasscer (*U. S. Dept. Agr., Bur. Ent. Circ. 121, pp. 15, figs. 2*).—This circular gives a summarized account of the life history and methods of control.

The oyster-shell scale, a species of world-wide distribution, was introduced into the New England colonies at an early date. In Canada and the Northern States there is thought to be but one full brood annually, whereas in the Middle and Southern States the species is double brooded. It has a wide range of food plants, 109 being here listed, but is more commonly found on the apple, maple, horse-chestnut, poplar, willow, and lilac. In some localities it appears to be held in check by parasites, those more commonly found being *Aphelinus mytilaspidis*, *A. abnormis*, *A. fuscipennis*, *A. diaspidis*, *Aspidiotiphagus citrinus*, *Anaphes gracilis*, and *Cheiloneurus diaspidinarum*.

The scurfy scale, a native of North America, occurs principally upon rosaceous plants, such as the apple, peach, pear, plum, cherry, etc., and also on the currant and gooseberry among cultivated plants. A list is given of 35 plants upon which it has been found. It seldom becomes sufficiently abundant to cause particular injury or to require specific treatment. "In the more northern States there is but one brood each year, but in the South, as in Tennessee and in Georgia, there are evidently two full broods, and in the latter State there is a strong probability of a third." Three predaceous species, *Tyroglyphus*

malus, *Chilocorus bivulnerus*, and *Hyperaspidis* sp. and three parasites, *Ablerus clisiocampæ*, *Physcus varicornis*, and a species of the genus Prospaltella, are recorded.

As means of control for both species, the importance of pruning out all dead and weakened parts preparatory to spraying orchards, shade or ornamental trees is emphasized. In orchards well sprayed during the dormant period for the San José scale, these species rarely prove troublesome. As there is a considerable difference of opinion among entomologists as to the effectiveness of the sprays applied during the dormant season to effect the destruction of the eggs, reports of several are quoted from. The authors consider it preferable, where the destruction of these insects alone is to be considered, to spray as the young are hatching out in the spring. Directions are given for the preparation and application of several of the more important insecticides which may be used against the pests, including kerosene emulsion, crude petroleum emulsion, whale-oil soap wash, lime-sulphur wash, miscible oils, and commercial lime-sulphur washes.

The morphology and life history of Crithidia gerridis, as found in the British water bug (Gerris paludum), ANNIE PORTER (*Parasitology, 2* (*1909*), *No. 4, pp. 348–366, pl. 1*).—The insect host of the Crithidia here considered, commonly known as the pond skater, is closely allied to *G. fossarum* which has also been found, at Madras, India, to harbor a Crithidia.

Trypanosoma lewisi in Hæmatopinus spinulosus, E. RODENWALDT (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 52* (*1909*), *No. 1, pp. 30–42, pls. 3, fig. 1; abs. in Sleeping Sickness Bur.* [*London*] *Bul. 12, pp. 458, 459*).—The following conclusions were arrived at:

"Neither trypanosomes nor anything like them were ever found in lice which had fed on uninfected rats; this is confirmed by Patton, Nuttall, Strickland, von Prowazek, and Gonder. Patton's species, *Crithidia hæmatopinus*, therefore does not exist. In lice which have fed on infected rats trypanosome forms are almost always found; when they are not, the lice are young.

"As a rule on the first 4 days, certainly on the first 2, no forms other than unaltered or dead trypanosomes are found nor the forms seen afterwards in increasing numbers from day to day which Rodenwaldt designates as 'lancet' forms and nuclear division forms. From the fifth to the seventh day occur Crithidia and Leptomonas forms very variable in shape, and there are found division processes of rosette form with young parasites which differ from the blood division forms. From the twelfth day the forms mentioned and others to be described later are found side by side in the same preparation."

The author thinks that the trypanosome is transmitted to the young rats from infected mothers during the 6 weeks of the lactation period, but doubts if transmission takes place in later life. Most of the older rats without trypanosomes were found to be immune. In order to determine if hereditary transmission occurred, nits were collected from infected rats and put upon healthy rats. The lice developed but there was no case of infection.

The codling moth, T. B. SYMONS and L. M. PEAIRS (*Maryland Sta. Bul. 142, pp. 135–176, figs. 25*).—The life history and habits of the codling moth are first considered, observations made in Maryland being reported.

"The first eggs on record for the past years at College Park, are 1 on April 25, 1908, 1 on April 28, 1909, and 2 on May 3, 1909. . . . Full grown first brood larvæ were observed as early as May 26, and the first of the second brood moths on June 14. These are exceptional, however, as second brood moths do not come out in numbers much before the first of July. Full grown larvæ are abundant under the bands after the first week in June; only in exceptional seasons do any but isolated individuals appear before that date. The large

majority of full grown first brood larvæ are found between June 18 and July 10, and the moths from these from July 1 to August 1. First brood larvæ may be found in the month of August, but of those which emerge later than the last third of July, only a small percentage pupate and produce a second generation; most of them go into their overwintering cocoons and do not pupate until the following spring. Our observations show eggs from the second brood moths as late as August 23 but from other data and observations from other stations, we may conclude that they continue to be laid at least until the middle of September. We have found and recorded full grown second brood larvæ in small numbers before the first of August and others still in the fruit after the first week in October. . . . The maximum number of second brood larvæ reach maturity in the month including the latter half of August and the first two weeks of September. . . . We have no evidence which would indicate the presence of even a partial third brood in this locality."

Remedial measures and methods of application are considered at some length and experiments reported which emphasize the importance of spraying. It is recommended that the first application, consisting of 1½ to 2 lbs. arsenate of lead or 5 to 10 oz. of Paris green, with or without Bordeaux, be given when the petals have nearly all fallen but before the calyx closes or the fruit drops. The second application should be made a week or 10 days later, Bordeaux being added. It is thought that ordinarily later treatments will not be necessary, although often advisable.

Two important leaf-miners, C. O. HOUGHTON (*Delaware Sta. Bul. 87, pp. 3–15, figs. 3*).—The first part of this bulletin is devoted to the apple leaf-miner (*Tischeria malifoliella*), a preliminary account of remedies for which has been previously noted (E. S. R., 19, p. 451).

Although described nearly 50 years ago and apparently of wide distribution, the species has not become of much economic importance until within the past 3 or 4 years. Winter is passed in the larval state, the full grown larvæ remaining in their silk-lined mines in leaves on the ground. Pupation takes place early in the spring, in Delaware usually late in March or early in April, and a little later the moths emerge. "The first mines are to be found late in May, and the moths from this brood of larvæ emerge late in June. . . . The second brood reaches maturity about a month later, the moths emerging late in July or early in August. A third brood evidently matures about September 1, while the larvæ of the fourth brood pass the winter in the leaves on the ground." Technical descriptions are given of the several stages of the insect. A species of Urogaster, probably *tischeriæ*, and of Eulophus, as well as several other parasites have been bred in Delaware from this insect.

As previously noted the pest can readily be controlled by plowing under the leaves and other débris, beneath and near the trees, late in the fall, or in early spring before the moths emerge.

The blackberry leaf-miner (*Metallus rubi*), the second insect pest considered, was a source of injury to a field of dewberries at Dover in 1905, a large percentage of the leaves being infested. Infestation since, however, has been to a much smaller extent. The species has been recorded from Illinois, Missouri, New York, Rhode Island and from Canada. It is thought to pass the winter as a larva or pupa within its cocoon in the ground. Oviposition, in a normal season, appears to commence late in May. In 1906, the sawflies were abundant and apparently ovipositing on May 30, a few small mines being observed on this date in some of which larvæ were found, which measured 2 mm. or more in length. The larvæ of the first brood apparently reached maturity before the end of June, and those of the second late in July or early in August. Their mine is said to be without definite shape, being sometimes elongate, sometimes

more or less circular in outline. It is evident on both sides of the leaf, the whole inner portion of the mined section of the leaf being eaten away, apparently, and only the upper and lower epidermis remaining. A species of Rhysipolis was bred by the author in July from infested leaves, collected in June.

Although not tested, it is thought that an oil spray could be used with good results shortly before the larvæ leave the leaves, that some repellant could be used at the time the adults are depositing their eggs, and that the cultivation of the soil shortly after the larvæ leave the mines would destroy some of the larvæ. The most feasible method would seem to be that of gathering and destroying the infested leaves, especially those infested by the first brood.

Distoma larvæ in caterpillars, Von Linstow (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 49* (*1909*), *No. 3, pp. 331–333, fig. 1*).—The author reports finding a large number of minute Distoma larvæ in aquatic lepidopterous larvæ (*Hydrocampa nymphæ*). In many from 1 to 5 of these trematodes were found, and in one 35 were observed. The species of Distoma could not be determined. This is thought to be the first instance in which a lepidopterous species has been found to serve as a host for a Distoma.

A list is also given of aquatic insect larvæ of 29 species representing the orders Odonata, Ephemerida, Neuroptera, Coleoptera and Diptera in which Distoma larvæ have been found.

The Mycetophilidæ of North America. Part I, O. A. Johannsen (*Maine Sta. Bul. 172, pp. 209–276, pls. 3*).—In this, the first part of a synopsis of the Mycetophilidæ, the lower and economically less important subfamilies, namely, the Bolitophilinæ, Mycetobiinæ, Diadocidiinæ, Ceroplatinæ and Macrocerinæ are considered, with tables for the separation of genera and species.

So far as known most of the members of the family live upon and destroy mushrooms, not only the wild plants but occasionally cultivated varieties as well. The author has found that a large percentage of wild mushrooms are infested by these larvæ, particularly by those of the genera Exechia and Mycetophila. In several instances he has found them, in company with Phora larvæ, to utterly ruin a mushroom bed in the cellar of a grower. "The larvæ of Mycetobia live upon decaying wood, particularly of the apple or peach tree, though probably without injury to the sound wood. The Ceroplatinæ and Sciophilinæ as far as known live upon fungi and decaying wood. As they are comparatively rare they are not likely to be of economic importance. The Sciarinæ on the other hand are frequently mentioned by economic entomologists. Though often found in decaying mushrooms and in the earth in putrid vegetable matter I have never found them to be injurious to growing fungi. They are frequently present, feeding on potatoes affected by scab or rot, in some apparently well authenticated instances appear to be the precursor of some form of scab. They are found in apples associated with the railroad worm, in bulbs of tulips, and are occasionally reported by florists as damaging plant roots."

Occasional applications of pure and fresh pyrethrum in water at a strength of 1 oz. to from 4 to 8 gal. of water are suggested as a remedy against the species which feed upon cultivated mushrooms. "As a preventive measure the cellars may be closely screened and the beds covered with small mesh screen frames. For those which are associated with scab or rot the measures taken in combating these will also hold in check the ravages which may be occasioned by the insect. The remedies and preventive measures applied for the railroad worm or apple maggot and the codling moth will also control the apple midge."

Seven species of Platyura and one each of Paleoplatyura, Ceroplatus, Apemon, and Macrocera are described as new to science.

Fruit flies, W. W. Froggatt (*Dept. Agr. N. S. Wales, Farmers' Bul. 24, pp. 56, pls. 8*).—This account also forms part 3 of a report previously noted (E. S. R., 22, p. 559).

Influence of external conditions on the longevity of fleas, J. C. Gauthier and A. Raybaud (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 37, pp. 861–864*).—Studies of the effect of heat and cold on the longevity of fleas are reported.

The occurrence of Pulex cheopis on rats and mice from ships, W. Fromme (*Centbl. Bakt. [etc.], 1. Abt., Orig., 52 (1909), No. 2, pp. 243–248, pl. 1*).—During the period from January 1 to March 28, 1909, 728 rats and 81 mice collected from 51 vessels at the Hamburg docks were examined for parasites. From 51 of the rats and 2 mice 212 fleas were taken, of which 199 were *P. cheopis*, a species known to transmit plague, 11 were *Ceratophyllus fasciatus*, 1 was *Ctenopsyllus musculi*, and 1 could not be identified.

Three snout beetles that attack apples, F. E. Brooks (*West Virginia Sta. Bul. 126, pp. 105–124, pls. 4*).—This deals with the plum curculio, the apple curculio, and the apple weevil.

The plum curculio has been very abundant in West Virginia for several years, and was noticeably destructive to apples during the spring and summer of 1909, the apples in many unsprayed orchards showing, by the first of June, curculio marks in practically every fruit. Early spring varieties, such as Yellow Transparent and Early Harvest were stung until the fruit was scarcely recognizable. The fruit from three young York Imperial trees that had not been sprayed showed 1,229 stings, and in the 210 apples borne only 10 escaped injury. The parasite *Sigalphus curculionis* is said to be quite common in the State. "Ants of several species and the larvæ of soldier beetles were observed in Upshur County in 1908 to kill many of the curculio larvæ after they had left the fruit and were seeking places to pupate in the ground."

Spraying with an arsenical, preferably arsenate of lead, is considered the most effective means of preventing injury. "The spray should consist of from one to 3 lbs. of arsenate of lead to 50 gal. of water, or where Bordeaux mixture is used, the same amount of arsenate of lead to 50 gal. of the mixture." It is desirable, however, to make use also of other methods of preventing injury, such as jarring, cultivation of the soil beneath the trees during July and August to break up pupal cells, and the destruction of fallen fruit.

The apple curculio is much less abundant and destructive in the State than the two other species. The author has found this curculio on apple, plum, and wild crab at French Creek, Upshur County, and on wild crab at Seebert, Pocahontas County. "While, to our knowledge, it has never been a pest of serious consequence to the apple in West Virginia, yet the fact that it breeds here, quite probably in considerable numbers in many parts of the State, together with the fact that it seems to be forming a liking for cultivated apples, should lead the fruit grower to regard it with suspicion and to do what he can to prevent its rapid multiplication."

"Where the apple curculio becomes troublesome care should be taken that no thickets of wild crab or hawthorn are allowed to remain as breeding places near the orchards." Jarring is said to be effective against this species. A parasite (*Pristomeridia agilis*) was reared by the author in August, 1909, from wild crab apples infested with apple curculio larvæ that had been collected at French Creek.

The apple weevil (*Pseudanthonomus cratægi*) was found to be doing considerable injury to apples during the spring and summer of 1909. Previous to June, 1907, when it was observed attacking apples, little was known of its feeding habits. "The beetles emerge from hibernation early in the spring and

toward the last of May begin to lay eggs in young apples. . . . The last egg obtained from the beetles kept in jars was laid on June 24 and the last of the beetles died on July 8. Early in July the beetles of the second generation began to appear. The first adult of this generation was seen to emerge, with slight assistance, from an infested apple on July 7, one day before the last of the old generation passed away. By July 25, beetles from the early laid eggs were appearing in the breeding jars in considerable numbers though the last individual of them did not leave the apple until August 30. The period during which the beetles were emerging seemed to be considerably longer than the period of oviposition. This was due to the great variation in the length of time required by the different individuals to complete their transformation. A difference of several weeks, in this respect, was noticed in the individuals which developed from eggs laid by a single female during 1 day in 1 apple." It is concluded that but one generation is produced annually. In addition to feeding on the fruit, a limited portion of their food is obtained from the leaves by scraping fragments of the tissue from the upper surface, which habit is important as it brings the species more readily within the reach of arsenicals.

"The feeding punctures, in cases where decay does not set in, usually heal over so that they show only as minute scars in the ripe fruit, and the same is true of the egg punctures where the eggs fail to hatch or where the larvæ die soon after beginning to feed, as is often the case. . . . The larvæ that hatch from the eggs feed on the fruit, forming tortuous tunnels through the flesh, or, more often, make large and irregularly shaped feeding chambers about the core." Four or 5 days are required for the incubation of the egg. "The larval period was found to vary greatly in length ranging from 18 days, in one case, to 53 days in another. Its average duration seemed to be about 30 days." The exact length of the pupal stage was observed in only 4 individuals, in each of which it was 8 days.

Spraying with arsenicals appears to be quite effective, as many of the beetles are killed by swallowing the poison that adheres to the leaves. A parasite bred from a full grown weevil larva has been identified as *Bracon anthonomi*, a species reared in 1892 from the strawberry weevil.

Injuries to forest trees by flat-headed borers, H. E. Burke (*U. S. Dept. Agr. Yearbook 1909, pp. 399–415, figs. 12*).—In this paper the author describes some of the more important buprestid larvæ, the nature of their injury, and remedial measures.

"Flat-headed borers injurious to forest trees are of 2 principal classes—those which destroy the vital part of the tree, the bark, and cause its death, and those which damage or destroy its principal product, the timber." The flat-headed bark-borers considered are the two-lined chestnut borer (*Agrilus bilineatus*), bronze birch borer (*A. anxius*), flat-headed western hemlock bark-borer (*Melanophila drummondi*), and flat-headed eastern hemlock bark-borer (*M. fulvoguttata*). The flat-headed wood-borers discussed are the flat-headed bald cypress sapwood borer (*Acmæodera pulchella*), flat-headed bald cypress heartwood borer (*Trachykele lecontei*), flat-headed big tree heartwood borer (*T. opulenta*), flat-headed western cedar heartwood borer (*T. blondeli*), flat-headed turpentine heartwood borer (*Buprestis apricans*), golden buprestis (*B. aurulenta*), large flat-headed pine heartwood borer (*Chalcophora virginiensis*), and flat-headed sycamore heartwood borer (*C. campestris*). The nature of the work of each is shown by drawings.

It is thought that much of their injury can be prevented by the use of methods of control recommended by expert forest entomologists.

The chalcidoid parasites of the common house or typhoid fly (Musca domestica) and its allies, A. A. Girault and G. E. Sanders (*Psyche, 16 (1909)*,

No. 6, pp. 119–132, figs. 5; 17 (1910), No. 1, pp. 9–28).—In this, the first of a series of 3 papers, the authors consider the reconstruction of the chalcidoid genus Nasonia of the family Pteromalidæ. *Nasonia brevicornis*, the type species of the genus from Illinois, is described and its biology considered at some length.

"The genus attacks gregariously or 'socially' the puparia of 3 or 4 genera of the higher Diptera—Chrysomyia (*macellaria*), Lucilia, Musca (*domestica*) Sarcophaga, and Phormia (*regina*); also it may be found to attack Calliphora. . . . In nature, the genus attacks mostly Chrysomyia (*macellaria*) and Phormia (*regina*), so far as is known. In confinement, it readily attacked the puparia of *Cynomyia cadaverina*, in addition to the others. Though gregarious, it is an external parasite, the larvæ not penetrating the host's body."

N. brevicornis was abundant in the insectary at Urbana, where fly-breeding cages were located, during the summer and early fall of 1908. Both sexes crawl very fast and the female is able to fly, though crawling seems to be the favorite means of locomotion. The males do not fly and their wings are apparently non-functional.

"Examinations made of parasitized hosts, showed that in all cases, the parasite is 'social' or gregarious and does not attack the host until after the formation of the puparium, preferably after the latter has been formed for at least 24 hours. Puparia of *Phormia regina* examined, were in some cases filled entirely with the larvæ of the parasite which had totally consumed the host pupa; for example, from one puparium 47 larvæ of the parasite were removed. . . . In 119 puparia there were 1,496 individuals of *Nasonia brevicornis*, of which 710 were males and 786 females. The average number of males in each puparium was 5.96, of females 6.60." In one instance, the female was able to parasitize successfully 22 host puparia and another 17 puparia, when quite a number were available. The parasite is said to hibernate as a full-grown larva in the puparia of its various hosts, pupating in the spring and emerging shortly afterwards.

Technical results from the gipsy moth parasite laboratory.—II. Descriptions of certain chalcidoid parasites, J. C. Crawford (*U. S. Dept. Agr., Bur. Ent. Bul. 19, pt. 2, tech. ser., pp. 13–24, figs. 16*).—The new species here described were bred from material collected in Japan and Europe for the purpose of rearing parasites of the gipsy and brown-tail moths.

A table is first given of the species belonging to the genus Chalcis known to occur in the United States, including those introduced purposely, of which two, *C. fiskei* a parasite of Tachinidæ and *C. paraplesia* parasitic in the pupæ of Sarcophagidæ, both from Japan, are described as new to science. *Hypopteromalus apantelophagus* and *H. pœcilopus*, both accidently included in shipments of parasitic material, the former reared from *Glyptapanteles japonicus* from Japan, and the latter from a species of Glyptapanteles from Europe, and *Pleurotropis orientalis*, *P. howardi*, *Perilampus inimicus*, and *Dimmockia secundus*, all reared from *G. japonicus*, from Japan, are also described as new.

The ticks (*An. Soc. Rural Argentina, 43 (1909), No. 56, pp. 42–45, figs. 2*).—Descriptions and illustrations of 8 of the more common species are given.

Experiments upon the transmission of Spirochæta gallinarum and S. obermeieri, C. Schellack (*Arb. K. Gsndhtsamt., 30 (1909), No. 2, pp. 351–362*).—The details of experiments conducted are here reported.

It was found that *Argas reflexus* and *Ornithodoros moubata*, as well as *A. persicus* and *A. miniatus*, may transmit *S. gallinarum*. The Brazilian virus was transmitted in a greater percentage of cases by *A. miniatus* than by the other 3 species. The incubation period for spirochetes transmitted by *A. miniatus* is constant (from 6 to 7 days), but this is not the case with *A. re-*

flexus. Broods from infected *miniatus* ticks are not pathogenic and several experiments conducted indicate that those from infected *reflexus* adults are not. Experiments with *Dermanyssus avium* resulted negatively.

From experiments with bedbugs which were transferred directly from infected to uninfected hosts, in which different periods had elapsed before the transfer, and in which the young of infected bugs were used, the author concludes that this insect does not transmit the spirochete of the European form of recurrent fever. The spirochetes can live for a long time in the intestines of bedbugs and may, however, occasionally be disseminated in this way. Transmission experiments with *A. reflexus* on rats gave only negative results. Attention is called to the fact that the studies of several authors have shown the body louse to be the important agent in the transmission of *S. obermeieri*.

Fighting the insect pests and diseases of orchard, field, and garden crops, H. L. Price (*Virginia Sta. Circ. 7, rev., pp. 2-148, figs. 65*).—A revised and enlarged edition of this circular, previously noted (E. S. R., 21, p. 351).

Insects associated with the cotton plant in Ceylon, E. E. Green (*Trop. Agr. and Mag. Ceylon Agr. Soc., 33 (1909), No. 4, pp. 318-321*).—A brief account of the more important species.

Guide to the investigation of animal parasites of man and the domestic animals, M. Braun and M. Lühe (*Leitfaden zur Untersuchung der Tierischen Parasiten des Menschen und der Haustiere. Würzburg, 1909, pp. VII+186, figs. 100*).—An account of the chief parasites of man and domesticated and other animals.

Lead arsenate, J. K. Haywood and C. C. McDonnell (*U. S. Dept. Agr., Bur. Chem. Bul. 131, pp. 49, pls. 4, fig. 1*).—Studies in cooperation with the Bureau of Entomology, extending over a period of 2 years, and inaugurated principally for the purpose of determining the conditions which cause lead arsenate to be injurious to foliage, are reported.

Data obtained from the 18 manufacturers of the product in this country in 1908 indicate that approximately 2,500 tons was sold during that year. The first part of the bulletin relates to analyses made to determine the quality of the leading arsenates as found on the market in different sections. The methods of analyses are described, and the results reported in tabular form.

As a considerable variation in moisture content was found, it is recommended that the product be packed in air-tight packages and always bought in plainly labeled original packages. In several of the samples examined, it was found that the acetic acid had not been completly washed out. One of the samples examined was lead arsenite and another was a mixture of the arsenate and arsenite in about equal proportions. A great variation was found in the composition of different samples. "The content of arsenic oxid ranges from 6.03 to 43.81 per cent (the latter as As_2O_5); lead oxid varies from 23.06 to 72.57 per cent; moisture from 0.41 to 61.84 per cent; water-soluble arsenic from 0.02 to 5.45 per cent (As_2O_5); and water-soluble impurities from 0.08 to 7.54 per cent." When the determinations were calculated to moisture-free material a much greater uniformity was found, but there was still a considerable variation. Arsenic oxid ranged from 10.30 to 44.70 per cent (the latter As_2O_5); lead oxid from 49.58 to 77.93 per cent; water-soluble arsenic oxid from 0.03 to 5.56 per cent (As_2O_5); and water-soluble impurities from 0.14 to 13.86 per cent. "While some of the firms are making a good product, this can not be said of all."

The second part of the bulletin takes up homemade lead arsenate and the chemicals entering into its manufacture, the methods of analysis, composition of the chemical formulas, and directions for preparation, etc., being considered. The third part reports experiments made to determine the action of lead

arsenate on foliage. These were conducted particularly for the purpose of determining by what solvent the lead arsenate is acted upon that renders more or less of the arsenic soluble so that burning of the foliage results.

During the investigations in 1907 no injury resulted to the foliage of the apple from any of the mixtures applied and only very slight injury to that of the peach, none being of a decided enough character to attribute it with certainty to the spraying. Similarly in 1908, the foliage of the apple trees was not injured in any case from applications of pure lead arsenate or any of the by-products naturally formed in its manufacture. "Rather severe injury was caused to the foliage and fruit of the peach by pure lead arsenate, made either from lead acetate or lead nitrate, and the same was true when the salts formed as by-products in the making were not washed out, whether applied with or without lime. The fruit was of a deep red color which generally extended throughout the flesh, and maturity was hastened about one week. Lead nitrate caused severe injury to the foliage but not to the fruit. Lead acetate in the stronger application caused slight injury to the foliage, but very materially protected the fruit from insect injury. Sodium acetate and acetic acid, acetic acid alone, and sodium nitrate produced no injurious effect on the foliage or fruit in the strengths applied. . . . No injury from previous spraying could be detected on May 25, when the final application was made. Five hot, clear days, without rain, followed this application, and on June 4, 10 days after the application, very decided injury was observed." Thus it appears that during the years 1907–8 no injury resulted to apple foliage from 3 applications of lead arsenate, made from sodium arsenate and lead acetate, or sodium arsenate and lead nitrate, when applied at the rate of 1½ lbs. (dry basis) to 50 gal. of water.

Lead arsenate prepared from lead nitrate possesses several qualities which make it slightly more desirable for spraying purposes than that prepared from lead acetate, but it is more dangerous to use if not properly made. "In very minute quantities arsenic appears to exert a stimulating effect or act as a tonic [on foliage], as it does on animals. It is probably this action which, by accelerating the functional activity of the leaf and producing more rapid assimilation, causes the excessive reddening and hastens the maturity of the fruit. On the other hand, if too large an amount is absorbed, it has a toxic effect, resulting in retarded assimilation, which in turn will cause the fruit to shrivel and drop before it has matured."

In experiments to determine the action of the carbon dioxid of the air, lead arsenate was found to be slightly less soluble in distilled water saturated with carbon dioxid, even when heated to 50° C., than in cold distilled water free from carbon dioxid, and it would hardly be expected that the results could be otherwise on the tree. A large amount of arsenic was dissolved by solutions of sodium chlorid and sodium carbonate, and also by a sample of water tested. "It would appear from these results that if certain salts commonly occurring in waters are present in more than very small amounts they will exert a solvent action on the lead arsenate."

Still more exhaustive orchard experiments than those here reported were conducted in 1909 in which lead arsenate was applied to peach trees in the same proportions as in other experiments [1½ lbs. (dry basis) to 50 gal.], 3 applications being made. These are briefly summarized as follows: "When applied with spring water . . . some injury to foliage resulted, but it was not nearly so marked as in the preceding year, and a longer time elapsed before the injury was noticeable. When applied with distilled water very slight injury occurred, noticeably less than when the spring water was used. When applied with distilled water to which 10 grains per gallon of sodium chlorid had been added, rather serious injury resulted. When distilled water containing 40 grains of

sodium chlorid per gallon was used, the injury was very much increased, practically 50 per cent of the foliage being affected. When applied with distilled water containing 10 grains of sodium carbonate per gallon, injury was noticeable 14 days after the first application, and 7 days after the third application the trees were almost completely defoliated. Applied with distilled water containing 10 and 40 grains of sodium sulphate per gallon, some injury resulted, but this was not so marked as that produced in the presence of sodium chlorid. In similar experiments where lime was added at the rate of 4 lbs. to 50 gal. injury to the foliage was almost entirely prevented."

FOODS—HUMAN NUTRITION.

Prices of meat, JAMES WILSON (*U. S. Dept. Agr. Rpts. 1909, pp. 15–31; Rpt. 91, pp. 10–24; Yearbook 1909, pp. 15–31*).—As a part of his annual report the Secretary of Agriculture gives special attention to a discussion of the prices of meat, and as the result of a special inquiry, discusses the increase in retail prices over wholesale, the conditions affecting meat supply, meat price movements, and beef and pork prices, and gives a general summary of the movement of meat prices.

From reports obtained in 50 cities throughout the United States it appeared that "the mean gross profit in selling beef, that is, the total retail cost charged to consumers above the wholesale cost paid by the retailers, is 38 per cent. In 5 cities the rate of increase is 20 per cent or under; in 10 cities, 21 to 30 per cent; in 12 cities, 31 to 40 per cent; in 12 cities, 41 to 50 per cent; and in 11 cities over 50 per cent."

As regards factors affecting retail costs of meat, the expense of delivering goods, the overdoing of the retail business by the multiplication of small shops, and the tendency on the part of consumers to focus their choice of cuts on steaks and roasts of "names regarded as respectable" are enumerated and discussed.

In the summary of data regarding conditions affecting meat supply attention is drawn particularly to the fact that the production of stock cattle has been diminished by range abandonment, to the new demands made on farms for corn for beef production, to the high price of corn, to high prices of all meat, partly because of high corn prices, to the fact that the production stock of hogs was reduced in 1907, to high farm land values, and to the fact that both supply and cost of meat production have united to raise meat prices. Furthermore, "for 70 years the production of meat has declined relative to population; meat exports increased until 1906, after which they sharply declined; there has been a decreasing meat consumption per capita; [and] increased per capita consumption of cereals, vegetables, fruits, and saccharine foods."

Data regarding beef prices are also summarized and discussed.

Economical use of meat in the home, C. F. LANGWORTHY and CAROLINE L. HUNT (*U. S. Dept. Agr., Farmers' Bul. 391, pp. 43+II*).—Information regarding the value of meat as food, the proportion of different cuts and their relation to meat prices, the texture and flavor of meat, and general methods of preparing meat for the table are discussed as well as ways of reducing the expense for meat in the diet, the publication as a whole being based upon the results of experiments which have been carried on as a part of the nutrition investigations of the Office of Experiment Stations. Lessening of expense for meat in the diet, it is pointed out, involves such factors as a decrease in the amount of meat used, the buying of meat in quantity for home use, the better utilization of the fat, trimmings and other parts often wasted, and a special attempt to prepare palatable meat dishes from the less expensive cuts.

Recipes collected from many sources and tested are given and the attempt is made to present this material in such a way that it may illustrate the principles of meat cookery for the home table. Topics of especial importance in this connection are methods of extending the flavor of meat, the utilization of the cheaper cuts in palatable dishes, and the development and improvement of meat flavor.

"Exactly how much meat should be eaten is a difficult matter to determine; probably if one meat dish is served a day, and other materials supplying protein, such as milk, eggs, beans, or similar foods, are also used there is little danger of getting too much meat or too little protein. It is of course possible to eat meat dishes less frequently, or . . . to omit meat from the diet altogether, if one so desires and the diet is so arranged that it remains well balanced.

"Meat is in general one of the most digestible of food materials. Recent experiments indicate that all kinds are thoroughly digested, less expensive cuts as well as the more costly. The higher priced ones contain more of the so-called extractives of more pleasing quality, and it is the extractives which not only give the meat its agreeable flavor, but also actually stimulates the digestive processes. They have, however, little if any nutritive value, and for persons with normal digestion the less expensive cuts even if less rich in extractives, cooked and flavored in an appetizing way, may certainly be used to replace the more costly cuts.

"Meat is undeniably one of the more expensive items in the food bill of the ordinary family, and for this reason it is important that it be bought and used to the best possible advantage."

Recommendations regarding the preservation of fresh meat, KÜSTER, HOLTZ, and FÖRSTER (*Min. Bl. K. Preuss. Verwalt. Landw. Domänen u. Forsten, 6 (1910), No. 2, Anz. Beilage, pp. 69, 70*).—This article has to do particularly with the use of sodium sulphite, sulphur fumes, and sulphurous acid as meat preservatives.

The influence of nitrogen on the keeping quality of meat and notes on the bacteriology of the spoiling of meat, W. LANGE and K. POPPE (*Arb. K. Gsndhtsamt., 33 (1909), No. 1, pp. 127–144, figs. 2; abs. in Biochem. Zentbl., 9 (1910), No. 12–13, p. 607*).—The conclusion was reached that storing meat in an atmosphere of nitrogen was without effect on its keeping quality. No free ammonia was noted when meat spoiled under such conditions nor were obligate anaerobic bacteria discovered.

Milling qualities of South Australian wheats, W. ANGUS and A. E. V. RICHARDSON (*Jour. Dept. Agr. So. Aust., 13 (1909), No. 5, pp. 382–387, dgm. 1; 13 (1910), No. 6, pp. 483–490, figs. 2*).—A large number of samples of Australian wheats were included in this comparative study. In several cases the flours ground in a small experimental mill were compared with commercial flours from the same varieties.

Flavor in bread, C. W. MAKIN (*Nat. Baker, 15 (1910), No. 171, pp. 48, 50*).—In a paper delivered before the Manchester Bakery Students' Society the questions of yeast in relation to bread flavor and other similar matters are considered.

Milk value in bread, W. E. BREEZE (*Nat. Baker, 15 (1910), No. 171, pp. 44, 48*).—In an address delivered before the Manchester Bakery Students' Society on the effect of adding milk in bread making upon the food value of bread, the composition of bread of different types, the bacteria of milk, the character of the dough, and other similar questions are discussed.

[Bacteria in bread], A. AUCHÉ (*Semaine Méd. [Paris], 35 (1910), No. 9; rev. in Brit. Med. Jour., 1910, No. 2569, pp. 771, 772*).—The results of experiments are reported in which *Bacillus typhosus, B. paratyphosus, B. dysentericus*

(Shiga), *B. dysentericus* (Flexner), *B. coli*, *Streptococcus pyogenes*, *Staphylococcus aureus*, and a variety of Proteus were added to bread dough before baking.

Cultures made from the baked bread showed that it was sterile. The author considers it possible that while micro-organisms which have great resistance to heat, such as tetanus bacillus, may not give the same results, yet so far as the organisms investigated are concerned, they are destroyed by the process of baking, and apart from accidental contamination of the surface after it leaves the oven, bread may be considered an aseptic article of diet.

Manufacture of nutritious bread (*French Patent 950,920, March 1, 1910; Oper. Miller, 15 (1910), No. 4, pp. 249, 250*).—A bread invented by C. A. Heudebert is described in which casein is incorporated in the dough.

Gluten bread (*French Patent 950,921, March 1, 1910; Oper. Miller, 15 (1910), No. 4, p. 250*).—A gluten bread devised by C. A. Heudebert is described in which soluble casein is incorporated with gluten.

The influence of winter feeding with beet sugar upon the composition of honey, E. Baier (*Jahresber. Nahrmtl. Untersuch. Amt. Landw. Kammer Brandenb., 1908, p. 22; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 6, p. 346*).—In the case of bees well fed beet sugar for a considerable time in autumn the honey when examined in spring was found to contain 1.9 per cent saccharose. In the case of another swarm fed beet sugar the honey contained 8 per cent saccharose and that of a third swarm 4 per cent.

Experiments with apple marmalade and jelly, A. C. Chauvin (*Monit. Sci., 4. ser., 24 (1910), I, No. 819, pp. 163–165*).—The results of tests are reported in which apple marmalade and jelly were made with saccharose alone and with saccharose and glucose and dextrin. Special studies were made of the ash and of the character of the sugar before and after cooking.

According to the author's conclusions, if dextrin is added to apple marmalade or jelly before cooking a considerable part of the dextrin will be saccharified and the results might be interpreted to indicate the presence of added glucose. When cooking is carried somewhat too far with marmalade or jelly made without added dextrin, dextrin is formed and changed into reducing sugar which might equally well be interpreted to indicate the presence of added gulcose.

Highly colored confectionery, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 200, pp. 13*).—This report covers 149 samples of candy, purchased throughout Canada.

The inspectors were instructed to procure highly colored confectionery, and "it is gratifying to find that only a single sample gave any reaction for arsenic, and this a quite negligible trace, entirely harmless." In general, the results "may be interpreted to mean that harmless dyes only are employed by Canadian candy manufacturers.

"Several samples were dirty and flyspecked, evidently having been exposed in the shop. It may not be out of place to emphasize the importance of keeping candy in glass, or other close receptacles. It is not enough that a piece of muslin or gauze should be spread over the candy. This is no protection against dust, and in most cases, none against flies."

From the data reported it appears that the cheaper grades of candy represented by this collection contained "from 50 to 70 per cent of cane sugar for the softer varieties, and from 70 to 85 per cent for the harder kinds. The other ingredients are of harmess character."

Habit-forming agents: Their indiscriminate sale and use a menace to the public welfare, L. F. Kebler (*U. S. Dept. Agr., Farmers' Bul. 393, pp. 19, figs. 5*).—Soothing sirups, medicated soft drinks, treatments for diseases of the nose

and lungs, headache mixtures, drug-addiction treatments, and other habit-forming agents are discussed on the basis of investigations carried on by the Bureau of Chemistry.

As regards medicated soft drinks it is stated that during the last 20 years a large number of such goods containing caffein and smaller or greater quantities of coca leaf and kola nut products have been placed on the market. "Preparations of this class, on account of insufficient information, were formerly looked upon as harmless, but they are known to be an impending evil. . . .

"The kola nut was prominently brought forward about 25 years ago as an agent for the relief of fatigue, but in this respect it has been a disappointment. For some time it was thought that the nut possessed some peculiar substance which accounted for this characteristic, but searching investigations showed that its chief active agent is caffein. Whatever virtue the drug possesses, therefore, appears to be due largely, if not solely, to this constituent. . . .

"Various arguments have been advanced in justification of the use of caffein and the extract of coca leaves, treated or otherwise, in soft drinks. It is well known that parents, as a rule, withhold tea and coffee from their children, but having no knowledge of the presence of cocain, caffein, or other deleterious agents in soft drinks, they unwittingly permit their children to be harmed by their use."

As a means of bettering existing conditions with respect to the sale of such articles as those discussed in this publication, education, and the enactment of adequate legislation are especially recommended.

[Inspection of dairies and of bakeries, confectioneries, ice cream manufacturing plants, cold storage plants, meat markets, and slaughterhouses, and the results of the examination of food materials], W. D. SAUNDERS ET AL. (*Ann. Rpt. Dairy and Food Comr. Va., 1 (1908–9), pp. 38–111*).—Reports are presented regarding the condition of the dairies, bakeries, etc., examined, and the results are given of the examination of a number of samples of food materials and beverages.

[Pure food and inspection work in North Dakota], E. F. LADD and EMILY E. MAY (*North Dakota Sta. Spec. Buls. 21, pp. 131–146; 22, pp. 147–162*).—A number of topics which have to do with pure food legislation, pure foods, drugs, paints, and the inspection of places where food products are prepared, stored, and exposed or distributed, are discussed, directions for preserving eggs in water glass are given, and the results of the examination of a number of food products, beverages, and formaldehyde are reported. Analyses are also reported of lignite coal, bran, shorts, and mixed feed, and information is reprinted from an earlier publication (E. S. R., 22, p. 262) regarding stock remedies.

Food inspection decisions (*U. S. Dept. Agr., Food Insp. Decisions 117, 118, p. 1 each*).—These decisions have to do, respectively, with the use of certified colors and with the labeling of whisky compounds under Food Inspection Decision 113 (E. S. R., 22, p. 664).

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 232–238, pp. 2 each; 239, p. 3; 240, 242–246, p. 1 each; 247, pp. 2; 248, p. 1; 249, pp. 3; 250, pp. 5; 251–255, 257, pp. 2 each; 258–260, p. 1 each; 261, pp. 2; 262–263, p. 1 each; 266, pp. 9*).—These notices of judgment have to do with the misbranding of drugs, molasses, sirup ("cafe-coca compound"), lemon flavor, gluten flour and gluten farina, canned tomatoes, and macaroni; the adulteration of confectionery ("silver dragees"), evaporated egg, shelled peanuts, molasses, and herring; and the misbranding and adulteration of cider vinegar, apple jelly, vinegar, vanilla extract, olive oil, Damiana gin, strawberry flavor, turpentine, evaporated apples, lemon extract, and buckwheat flour. Notice of Judgment 250 also contains a subject index of all Notices of Judgment 1–250.

The composition of some Bengali food materials, HOPE SHERMAN and H. L. HIGGINS (*Jour. Amer. Chem. Soc., 32 (1910), No. 4, pp. 558–561*).—The samples examined included wheat, wheat ata (wheat flour), rice, gram, corn, dried peas, and similar materials. The samples were furnished by D. McCay and are of interest especially in connection with his study of the dietetic habits of Bengalis previously noted (E. S. R., 20, p. 767).

"Of special interest in the results here shown is the large amount of fat in the wheat ata. The proportion of fat in wheat flour, as commonly used in this country and as shown by some 200 analyses, is from 0.3 to 1.9 per cent, while for the 2 samples of wheat ata analyzed by us, it was 3.39 and 2.14 per cent, respectively, and 2.90 per cent as shown by the Calcutta analyses [quoted for comparison]. The higher percentage of fat will result in a corresponding increase in the heat of combustion. The proportion of fat in the gram dhall is also high as compared with other varieties of dhall, being fully three times that shown for any of the others, and the heats of combustion are likewise higher."

[Food of a poor family in Buffalo and one in Boston], EMMA O. LUNDBERG (*Survey, 23 (1910), No. 20, pp. 728–730*).—In connection with a review of a volume previously noted (E. S. R., 21, p. 770), the author has given some data regarding the diet of two families with small incomes and has calculated the nutrients and energy supplied by the daily food.

According to her data, the Buffalo family, consisting of father, mother, and three children, with an income of about $600 a year, spent for food an amount equal to 20 cts. a day for an adult. The diet supplied 170 gm. protein and 3,805 calories for an adult per day. In the case of the Boston family, consisting of a mother, two children, and an infant, the calculated value of the diet was 101.2 gm. protein and 3,797 calories. [Misprints in the published figures have been corrected in the abstract in accordance with data supplied by the author.]

Cost of living in Belgian towns, G. R. ASKWITH (*London: Govt., 1910, pp. XVI+218, map 1*).—The results are given of an extended inquiry into the housing, rents, budgets, retail prices, and hours of labor of Belgian workingmen, and similar topics, 15 of the chief industrial towns being included. The detailed reports are summarized and discussed with reference to conditions in England and Wales.

"If allowance be made for the element of local rates included in the English rents, the predominant rents paid in Belgian towns are only about three-quarters of those paid in English towns for a corresponding amount of accommodation.

"As regards prices, on the other hand, there does not appear to be any such marked difference, the general level in Belgian industrial towns being only slightly below that prevalent in similar towns of England and Wales. Consequently, on the assumption which has been adopted for these international comparisons, it follows that an English workman, with an average family, who should go to Belgium and endeavor to maintain there his accustomed mode of living, would find his expenditure on housing, food, and fuel slightly diminished. But at the same time, so far as can be judged from the trades selected for international comparison, he would find his wages reduced by about one-third, in spite of much longer hours. . . .

"Considered as a whole, the dietary of the Belgian working-class family would seem to compare very favorably with that of the British family enjoying the same income, especially when allowance is made for the smaller household. A smaller number of eggs, less cheese, a smaller quantity of the miscellaneous farinaceous foods, and much less sugar is consumed, and less is spent on coffee and chicory than is expended on tea by the British family. Against these

deficiencies are to be set a much larger consumption of bread and flour, of potatoes, and of butter, oils and of fats, and a slightly higher consumption of meat. It is important to remember, however, that this is, as stated, a comparison of families enjoying the same income. A comparison of the budgets for two working-class families each enjoying the average income characteristic of its own country would be much less favorable to Belgium owing to the low rates of wages ruling." See also previous articles of the series (E. S. R., 21, p. 464).

The art of baking, P. E. Laskowski (*Los Angeles, 1910, pp. 233, pl. 1*).—A large number of recipes are given, most of them especially designed to meet the needs of the professional baker. The author states that the recipes have been tested and that the suggestions made are the result of personal experience. Numerous statements regarding the cost of the various recipes and the selling prices of the products are a feature of the volume.

Bacterial food poisoning, Jacobitz and H. Kayser (*Centbl. Bakt.* [etc.], *1. Abt., Orig., 53 (1910), No. 4, pp. 377–387*).—The importance of bacteriological studies in cases of food poisoning and related matters are discussed and information summarized regarding poisoning from ham attributable to *Bacillus enteritidis.*

The data presented show that food poisoning from potato salad and flour soup made from rye flour, wheat flour, and a commercial fat (palmitin) was due to bacteria of the Coli type.

Outbreak of food poisoning after a Christmas dinner, C. E. P. Fowler (*Jour. Roy. Army Med. Corps, 13 (1909), No. 3, pp. 271–274*).—An outbreak of illness observed in about one-third of the total number of those who had partaken of a Christmas dinner was attributed to goose eaten, although actual proof was not possible.

The illness was in some cases quite severe and in one case fatal, *Bacillus paratyphosus* being isolated in the case of the patient who died. The author points out that it would be difficult to say in what manner the geese were affected. "It is probable that two or three out of the six had suffered from some disease before slaughter, and being undrawn the bacilli had multiplied, invaded the flesh, and formed their toxin, which would account for the acute onset in several of the cases. The carcasses being undrawn, it is difficult to imagine that they could have become infected with the organism after slaughter, although a contamination of food after preparation is perhaps the most common cause of such outbreaks."

Constituents of buckwheat and buckwheat disease, J. Fischer (*Untersuchungen über einige Bestandteile des Buchweizens in Rücksicht auf die Ätiologie der Buchweizenkrankheit. Inaug. Diss., Univ. Bern, 1909; rev. in Biochem. Zentbl., 9 (1910), No. 17 p. 787*).—Extracts of buckwheat were prepared with glycerin and hydrogen peroxid and tested in regard to their diastasic and proteolytic activity, with special reference to the etiology of buckwheat disease.

Both enzyms were found to be present and were shown not to be of bacterial origin. The hulls of the buckwheat were also found to contain a fluorescent body which can be extracted with alcohol, ether, and chloroform, and which causes by virtue of its chemical-mechanical irritating property an inflammation of the intestinal mucosa, hypertrophy of the liver and kidneys, and necrobiotic changes in the leucocytes. In white-coated animals this body greatly influences the destructive action of light on the peripheral leucocytes and produces the well-known skin disease. Animals with pigmented skins are not so readily affected, but continued feeding with buckwheat will also produce a mortality among them.

The physiological feeding of infants, E. PRITCHARD (*London and Glasgow, 1909, 3. ed., rev. and enl., pp. XVI+469, figs. 10*).—According to the author, this handbook on the practice and principles of infant feeding has been enlarged and entirely rewritten. Among the general topics discussed are breast feeding; the modification of cow's milk; milk, its supply and preservation; digestion and the development of the digestive organs; physiological feeding and its relation to nutrition; recipes for preparing certain foods for infants; and milks and milk preparations.

The metabolism of nitrogen in man, L. C. MAILLARD (*Rev. Sci. [Paris], 48 (1910), I, Nos. 9, pp. 257–264; 10, pp. 298–304, dgms. 8*).—A digest and discussion of data, a considerable amount of which is supplied by the author's investigations.

The influence of the removal of fragments of the intestinal tract on the character of nitrogen metabolism.—II, The removal of the small intestines, A. CARREL, G. M. MEYER, and P. A. LEVENE (*Amer. Jour. Physiol., 25 (1910), No. 7, pp. 439–455*).—From experiments with dogs the following conclusions were drawn:

"After the removal of the larger part of the small intestine the absorption of the ingested protein is diminished. The absorption of leucin is reduced. The rate of assimilation and of retention of the absorbed protein follows the same course as in normal animals. Comparison of these results with those obtained on animals after gastro-enterotomy makes it suggestive that the stomach and not the intestines is the organ principally concerned in the function of protein assimilation."

Have proteids of different composition a different nutritive value?—II, The physiological value of casein and its cleavage products, E. VOIT and J. ZISTERER (*Ztschr. Biol., 53 (1910), No. 9–11, pp. 457–498*).—It is probable that the physiological value of protein is unfavorably influenced by far-reaching cleavage and that this factor varies with the nature of different materials. It follows that, in general, proteid cleavage in the digestive tract is not complete but that, on the other hand, certain definite radicals are resorbed unchanged. The nitrogen-sparing property of different nitrogeneous substances offers a means of judging whether or not the material is suitable for protein synthesis in the body.

The use in the animal body of products obtained by far-reaching cleavage of proteids, XII, E. ABDERHALDEN and O. FRANK (*Ztschr. Physiol. Chem., 64 (1910), No. 2, pp. 158–163*).—According to the authors, the results obtained in the experiments showed that the products secured by heating meat with sulphuric acid were capable of replacing food protein.

The results of remineralization in conditions of faulty metabolism, such as neurasthenia, etc., H. HIGGINS (*Lancet [London], 1910, I, No. 8, pp. 482–491, figs. 2*).—On the basis of clinical and analytical data, particularly with reference to the character and partition of nitrogen and mineral constituents of the urine, the author discusses theories of nutrition in relation to mineral constituents of the diet.

His conclusions, as a whole, he points out, are against the general application of the purin-free diet theories and the low proteid diets, since he believes that serious consequences may attend the disturbance of the mineral equilibrium or balance of the diet. It is undeniable, he states, that such diets have their uses under certain circumstances, "but unless these conditions are defined they are often used for unsuitable cases. Prolonged personal experience has convinced me that it is possible to inflict irreparable damage to the tissues by persisting in the use of either unsuitable or inadequate dietaries. Above all, it is necessary

to remember that their evil effects may take years to declare themselves, without providing any recognizable subjective indications during the process.

"Biotechnics, or the art of adjusting individuals with their environment, consists in those modifications of the ration, of work, rest, climate, etc., necessary to attain and maintain the optimum chemical and physical equilibrium."

The metabolism and effect of common salt in healthy man, R. TUTEUR (*Ztschr. Biol., 53 (1910) No. 7–8, pp. 361–385*).—According to the conclusions drawn from the experiments reported, it is not possible to obtain daily chlorin equilibrum with medium, low, or high doses of salt. When either medium or small quantities of salt are taken, all of the chlorin is recovered after considerable time in the secretions. On the other hand, if repeated large quantities of salt are taken, retention of chlorin in the body is noted, which persists for a time. When a single large dose of salt is taken an excess of chlorin is excreted inside of 48 hours.

The chlorin content of the feces is small, being generally proportional to the amount of feces.

An increased quantity of salt, or rather the larger amount of water which is taken under such conditions, is responsible for increased diuresis. Other effects of salt on the urine are also considered. In general, the author concludes that a regulated quantity of salt has special significance for maintaining metabolic equilibrium.

Concerning the chlorin, calcium, magnesium, and iron content of normal human organs and also their water, protein, and fat content, A. MAGNUS-LEVY (*Biochem. Ztschr., 24 (1910), No. 3–5, pp. 363–380*).—A large amount of analytical data is reported and discussed in comparison with the work of other investigators.

ANIMAL PRODUCTION.

The theories of evolution, Y. DELAGE and M. GOLDSMITH (*Les Théories de l'Évolution. Paris, 1909, pp. 371*).—The authors of this book discuss the theories of heredity by which the evolution of plants and animals has been brought about in nature and under domestication. Considerable space is given to the questions of the influence of environment, adaptation, and inheritance of acquired characters. Although believing that acquired characters are inherited, the authors admit that positive proof is still lacking.

Mendelian phenomena without De Vriesian theory, W. J. SPILLMAN (*Amer. Nat., 44 (1910), No. 520, pp. 214–228*).—The author, whose views are somewhat similar to those of Holmes (E. S. R., 21, p. 470), is a Mendelian but does not believe in the De Vriesian doctrine that organisms are aggregates of separately heritable characters. He divides Darwin's fluctuating variations, amenable to the action of natural selection, into the 4 following types: (1) Variations due to Mendelian recombination of characters, (2) variations not inheritable as shown by the investigations of Johannsen and others, (3) variations due to irregularity of distribution of chromosomes in mitosis (De Vriesian mutation), and (4) variations due to changes in the germ plasm, which the author thinks are inherited and the most important factor in evolution. Reference is made to the work of Riddle, who has pointed out (E. S. R., 21, p. 374) that color inheritance may be explained by cytoplasmic differences without recourse to the idea of unit characters. The term "character differential" is proposed in place of "character pairs," as the influential factor may be a generalized function of the cell.

A new term, "teleone," is defined as any organ, tissue, substance, or cell organ which has the power of influencing the course of development. Teleones derived directly from the egg are called "primary," while those arising during

the course of development are "secondary teleones." The manner in which they are thought to function in heredity is explained in detail.

Studies in the experimental analysis of sex, G. SMITH (*Quart. Jour. Micros. Sci. [London], n. ser., 54 (1910), No. 216, pp. 577–604, pl. 1*).—This is a paper on sex heterozygotism, in which the author reports his observations on several species of invertebrates and discusses the different theories of Mendelian inheritance of sex.

An examination of several thousand specimens of a species of spider crab when parasitized by a cirripedian showed that the infected male assumed female characteristics in varying degrees of perfection, even to the development of ova in the testis. The female, however, never took on such secondary male characters. Other facts are cited which support the theory that in many species of animals one sex, either male or female, is always a sex hybrid, while the other is pure. According to the author the sex hybrid may appear as a male, a hermaphrodite, or a female according to some unknown physiological condition, and that external influences may give a bias to a heterozygous embryo to appear as either male or female. It is pointed out that sex may not necessarily be a simple unit character but, on the contrary, that the sex characteristics fall into 2 divisions, primary and secondary.

Reasons are given for assuming that there is an internal secretion which is continually changing in development, and acts and is acted upon by the various organs of the body. It is also assumed that this sexual formative substance or generative ferment (Heape) has male and female modifications which are allelomorphs, giving rise to the half hybrid nature of sex, but only future investigations can show under what physiological conditions one sex may gain the upper hand. The author's theory of the correlation between primary and secondary sexual characteristics differs from Cunningham (E. S. R., 21, p. 170) in assuming that there is some common factor back of both primary and secondary characteristics.

Sex and sexual characters, J. T. CUNNINGHAM (*Sci. Prog. Twentieth Cent., 4 (1910), No. 15, pp. 457–473*).—The view is expressed that Doncaster, in supporting the Mendelian view that sex is the property of gametes (E. S R., 22, p. 273), has failed to account for the artificial development of secondary sexual organs by means of chemical stimulation which has been obtained by Shattock and Seligmann with poultry, Nussbaum with frogs, and Starling and Claypon with rabbits. Several cases are used to illustrate wherein the author's view differs from Doncaster's. "If we make the weak ovum correspond with the male-bearing ovum, the selective union is between gametes of the same sex, not of opposite sexes—the weak ovum unites with a strong sperm and the latter is dominant. Thus, the sex is not determined by the ova alone or by the sperms alone, but by whichever is stronger, that is, the more vigorous are dominant." The distinction between adaptive and nonadaptive characters is thought to be the same as that between continuous and discontinuous variation.

The heredity of sex, F. KEEBLE (*Nature [London], 82 (1910), No. 2104, pp. 487, 488*).—Instead of assuming that the phenomena of sex are due to a single pair of allelomorphic characters, the author proposes a hypothesis of 2 independent pairs of characters, namely, "maleness (M), with its allelomorph, absence of maleness (m), which constitute one pair, and femaleness (F), with its allelomorph (f), which constitute the other pair. On this hypothesis, since Mm, Ff are independent of one another, representatives of both pairs of characters occur in every gamete.

"All gametes are therefore of one or other of the following sex constitutions, MF, Mf, mF, mf. Hence all zygotes produced by the pairing of such gametes are of one or other of the following nine gametic constitutions: 1 MMFF,

2 MMFf, 2 MmFF, 4 MmFf, 1 MMff, 2 Mmff, 1 mmFF, 2 mmFf, 1 mmff. [This gives] 9 MF, 3 Mf, 3 mF, and 1 mf. In zygotes MMFF and MmFf it may be predicted that circumstances, nutrition, etc., determine which type (male or female) of sexual organs is produced."

Recent literature touching the question of sex determination, H. E. Jordan (*Amer. Nat., 44 (1910), No. 520, pp. 245–252*).—The author reviews the work of Russo (E. S. R., 21, p. 269) and other recent investigators on this subject which furnish some evidence that sex can be controlled by nutrition and is independent of the number or character of the chromosomes.

On alternative inheritance in dogs, A. Lang (*Ztschr. Induktive Abstam. u. Vererbungslehre, 3 (1910), No. 1–2, pp. 1–33, figs. 4*).—Crosses were made between a brown short-haired bird dog with brown spots on a light abdomen and extremities and a long-haired black Newfoundland. The results agreed with those found with other mammals. In general the black, brown, and solid colors were dominant over the spotted, and short hair was dominant over long.

Crosses are also reported in which the short leg of the dachshund was usually dominant when crossed with other breeds.

Is there a correlation between the development of the horns and bones? G. Lauber (*Deut. Landw. Tierzucht, 14 (1910), No. 11, pp. 126, 127*).—The author measured the length and circumference of cannon bones of 42 cows of the Kehlheim breed and concludes that large and strong bones are generally associated with small horns and small bones with large horns.

Concerning inbreeding, A. de Chapeaurouge (*Einiges über Inzucht und ihre Leistung auf Verschiedenen Zuchtgebieten. Hamburg, 1909, pp. 98*).—This book is devoted to a discussion of the advantages of inbreeding, especially in horses. Many examples obtained from pedigree records are cited to show the service which inbreeding has rendered in the improvement of different classes of live stock.

Animal remains from the excavations at Anau and the horse of Anau in its relation to the races of domestic horses, J. U. Duerst (*Carnegie Inst. Washington Pub. 73, pp. 341–442, pls. 21, figs. 3*).—A detailed description of the prehistoric animals found in excavations in Turkestan, including discussions of the relationships of different wild and domesticated species of animals. Measurements of the subfossil bones found in these deposits are given.

The oldest species of wild ox found was *Bos namadicus*, the Asiatic form of *primigenius*. In later deposits, about 8000 B. C., a domesticated ox appeared, which is identical with *B. taurus macroceros* of Egypt. This species was later spread by tribal migrations. *B. taurus brachyceros* was a more modern and stunted form of *macroceros*.

An examination of the skulls of *Sus palustris* showed them to be the oldest known form of the turbary pig. In the early deposits there was a wild sheep, *Ovis vignei arkal*. A later domesticated species, *O. aries palustris*, reached its full development about 6250 B. C.

The Anau horse, *Equus caballus pumpellii*, a new species, is the oldest domesticated Oriental horse known and is ancestrally closely related to *E. przewalskii*, but possessed a more slender form. The genealogy of the Anau horse and its relation to the Arabian, the English thoroughbred, and other European horses is illustrated by a diagram.

Remains of the camel, goat, shepherd dog, which is closely related to the dingo, and hornless sheep were found at Anau in deposits which date back to about 5850 B. C., but apparently these were not indigenous but had been brought there by the migration of tribes from elsewhere.

Proceedings of the American Society of Animal Nutrition (*Amer. Soc. Anim. Nutrition Proc. 1909, pp. 36*).—Papers are here printed in full which have been previously noted (E. S. R., 22, p. 96).

Some observations on the fermentation of silage, W. M. ESTEN (*Science, n. ser., 31* (*1910*), *No. 797, pp. 547, 548*).—This is an abstract of a paper read before the Society of American Bacteriologists, December, 1909.

Lactic-acid bacteria grew profusely in corn juice until about 0.35 to 0.45 per cent of lactic acid was formed, when they ceased to grow. The yeasts were tolerant to much larger amounts of acid and continued to grow until practically all the sugar was used up. In fresh silage large numbers of yeasts and acid bacteria were found. The biochemical changes were nearly all completed during the first 12 days. The maximum growth of the acid bacteria was on the fourth day and the maximum growth of yeast on the twelfth. The highest temperature, 29° C., was noted the first 36 hours. Samples were taken from a hole in the silo 5 ft. from the bottom and from 1 to 2 ft. from the edge.

Investigations on the digestibility of palm-nut-cake meal and palm-nut meal from which the fat had been removed, E. WEINIGER (*Landw. Vers. Stat., 72* (*1910*), *No. 1–2, pp. 143–150*).—In digestion experiments with wethers, on a basal ration of hay, the average digestion coefficients of 2 kinds of palm-nut meal rich in fat were dry matter 76.4, protein 76.5, nitrogen-free extract 88.8, fat 78.6, and fiber 39.4 per cent. The coefficients for palm-nut cake from which the fat had been removed were dry matter 79.6, protein 74.2, nitrogen-free extract 92.6, and fiber 55.2 per cent.

Investigations on the digestibility of seed beet straw and sugar beet seed residue, P. EISENKOLBE (*Landw. Vers. Stat., 72* (*1910*), *No. 1–2, pp. 151–157*).—Digestion experiments were made with wethers in which hay, cotton-seed meal, and sugar formed the basal ration. The digestion coefficients of seed beet straw were dry matter 33.9, protein 40.5, fat 36.5, nitrogen-free extract 41, and fiber 24.9 per cent. The coefficients of beet seed residue were dry matter 37.1, protein 57.2, fat 63, nitrogen-free extract 45, and fiber 17 per cent.

Analyses of feeding stuffs grown on marshy soils, H. VON FEILITZEN (*Jour. Landw., 57* (*1909*), *No. 3, pp. 231–236*).—Analyses are reported of rye, barley, oats, hay, field pea (*Pisum arvense*), kale (*Brassica oleracea acephala*), vetch (*Vicia narbonensis* and *V. villosa*), Jerusalem artichoke, and *Sphagnum cuspidatum*.

Licensed commercial feeding stuffs, 1909, F. W. WOLL (*Wisconsin Sta. Bul. 194, pp. 3–94*).—Analyses of 766 samples of feeding stuffs are reported, including wheat, rye, barley, and buckwheat products, linseed and cotton-seed meals, gluten feed, alfalfa meal, blood meal, hominy, corn chop, corn-and-cob meal, malt sprouts, distillers' grains, tankage, beef scraps, meat meal, and mixed feeds. There is a discussion of results and of the amendments to the state feeding stuffs law.

Results of the examination of stock feeds, B. L. PURCELL (*Ann. Rpt. Dairy and Food Comr. Va., 1* (*1908–9*), *pp. 112–145*).—Analyses are reported of wheat, rye, and corn products, red dog flour, cotton-seed meal, oats, dried beet pulp, beef scraps, molasses feeds, and other mixed feeds.

Notice of judgment (*U. S. Dept. Agr., Notice of Judgment 256, pp. 3*).—This has to do with the adulteration and misbranding of a stock food.

Winter feeding of farm stock, H. G. MUNDY (*Rhodesian Agr. Jour., 7* (*1910*), *No. 3, pp. 1093–1101, pls. 3*).—This article describes methods of feeding dairy cows under the conditions which exist in Rhodesia.

The crops recommended for conversion into silage or dry fodder for winter feeding are maize, sweet sorghum, teosinte, sugar cane, pearl millet, Boer manna (*Setaria italica*), Japanese millet, teff grass (*Eragrostis abyssinica*),

velvet beans, cowpeas, Kafir beans (*Vigna catjang* var.), peanuts, and flax. Other crops which are suitable for providing winter feed are pumpkins, potatoes, rape, and cassava. The pasture grasses recommended are *Paspalum dilatatum*, *Dactylis glomerata*, tall fescue, Yorkshire fog (*Holcus lanatus*), burnet (*Sanguisorba minor*), and cow grass clover (*Trifolium pratense perenne*).

Steer feeding: Small grains and clover hay for two-year-old steers, R. W. CLARK (*Montana Sta. Bul. 78, pp. 39–48*).—A report of work carried on for 5 years to compare the effect of small versus large quantities of grain for steers.

In 1906–7 the feed consisted of clover hay and a grain mixture of barley, oats, and wheat. During the first period doubling the grain doubled the gain, while in the second period trebling the amount of grain increased the gain only 30 per cent. The cost of production decreased with the increase of grain in the first period when a small amount of grain was fed, but increased in the second period. When a large amount of grain was fed, trebling the amount of the grain ration more than doubled the cost of production.

The results in 1907–8 also showed that up to about 7 lbs. of grain per head per day the gain was proportional to the grain fed, but these results were due in part to the fact that the hay was of poor quality. During the 5 years the cheapest and largest daily gain was made during the first 2 years, this being due to the most perfectly cured hay. The average results of the 5 years are summarized in the following table:

Average results from feeding different amounts of grain to steers.

Ration.	Food consumed for 1 lb. gain.		Daily gain.	Cost of 1 lb. gain.
	Hay.	Grain.		
	Lbs.	*Lbs.*	*Lbs.*	*Cents.*
3 pounds grain per steer per day	18.2	2.18	1.12	7.64
5 pounds grain per steer per day	14.9	3.30	1.40	7.77
7 pounds grain per steer per day	15.4	4.60	1.50	9.20
10 pounds grain per steer per day	13.8	6.00	1.50	10.14

In computing the cost, grain was rated at $1 per hundredweight and hay at $6 per ton. There was a small profit every year except one on the steers fed, but the main advantage was in finding a market for the feed at reasonably good prices. There would have been no profit in feeding during the winter of 1907–8 if the feed had had to be purchased. "With well-cured clover hay the cost of gain is about one-half of that secured from poorly cured hay, if price of each is the same."

The buffalo, A. STAZI (*Bol. Quind. Soc. Agr. Ital., 15 (1910), Nos. 4, pp. 106–111; 5, pp. 143–149*).—A statistical and general account of the buffalo and its value for agricultural purposes in Italy, where it seems to be appreciated as the number has increased considerably during the past 20 years.

Fattening lambs, J. W. WILSON (*South Dakota Sta. Bul. 119, pp. 645–657*).—In 1908, 20 grade lambs 8 to 10 months of age were divided into 2 lots to compare the value of alfalfa and prairie hay. The grain ration consisted of oats, corn, and linseed meal in the proportion of 4:4:1. The lots were started on 1 lb. per head per day of this mixture, and this was increased until they were receiving 2.2 lbs. of grain daily. For every pound of grain fed the lambs in the alfalfa lot they consumed 1.3 lbs. of hay and made an average daily gain of 0.51 lb. per head, at a cost of 4.2 cts. per pound. For each pound of grain fed

the prairie hay lot 1 lb. of hay was consumed and an average daily gain was made of 0.38 lb. per head, at a cost of 5.3 cts. per pound. The grain mixture was rated at 1 ct. per pound and the hays at 3 cts. per pound.

In the autumn of 1908 experiments were made on the feeding value of rape pasture with 4 lots of 12 lambs each. The average gains per head per day for 44 days were on rape pasture alone 0.37 lb., on rape pasture and corn 0.37 lb., on rape pasture and oats 0.43 lb., and on rape pasture and barley 0.43 lb. In 1909 the figures for similar lots during a period of 31 days were 0.34, 0.32, 0.38, and 0.37 lb., respectively. The results in 1909 were less satisfactory than the previous year on account of the dry weather and early killing frosts. No trouble was caused from bloat when the lambs were first turned on rape, even when no other forage plant was accessible.

Feeding fish to swine, RAEBIGER (*Zentbl. Agr. Chem., 38 (1909), No. 12, p. 645; abs. in Illus. Landw. Ztg., 29 (1909), No. 31, p. 317*).—When swine were fed for 3 weeks on fish rich in fat there was a fishy and oily taste and smell in the flesh which could be detected even when the fish ration had ceased 14 days previous to slaughtering. The feeding of 1 lb. per day of fish meal from which the fat had been removed produced no unfavorable effect on the flesh.

Lincolnshire curly-coated or Baston pigs, W. J. COLEBATCH (*Jour. Dept. Agr. So. Aust., 13 (1910), No. 7, pp. 582–589, figs. 4*).—An account of this little known but valuable bacon pig of Lincolnshire, England. The daily gains of this and other breeds at the Smithfield show for 1908 are given.

The care of new born foals, A. S. ALEXANDER (*Wisconsin Sta. Circ. Inform. 13, pp. 7*).—This circular contains information for the practical horse breeder on the management of pregnant mares, the foaling box-stall, treatment of the foal at birth, raising the orphan foal by hand, and on navel and joint disease.

The improvement of Utah horses, J. T. CAINE, III, and H. J. FREDERICK (*Utah Sta. Bul. 107, pp. 97–142, figs. 18*).—This bulletin contains a brief account of the present position of horse breeding in Utah, descriptions of diseases and unsoundness which should be considered as constituting disqualifications, the score-cards used at the Utah College for judging horses and other information on this subject, the text of the state stallion law, a directory of pure-bred stallions licensed by the State, a list of American and foreign stud books recognized by the U. S. Department of Agriculture, and a financial report of the State Board of Horse Commissioners.

Horse breeding in Madagascar, C. SISTERON (*L'Élevage du Cheval a Madagascar. Paris, 1909, pp. 115, pls. 21*).—This official report to the French minister of war gives a brief history of the present status of horse breeding in the colony. Interesting facts are related concerning early importations of horses which date from 1817. Little progress was made until 1897, but since that time importations have been made from Arabia, Abyssinia, Tunis, Algeria, and France. The chief breeding centers are Imerina and Betsileo.

Measuring horses, P. GOLDBECK (*Deut. Landw. Presse, 37 (1910), No. 24, pp. 269, 270, figs. 7*).—This article discusses the importance of making accurate measurements of horses, describes the instruments used, and gives results of measurements made of several European breeds.

A measuring stick for horses, R. SCHOENBECK (*Deut. Landw. Tierzucht, 14 (1910), No. 10, p. 112, figs. 2*).—This is a description and illustration of a new form of folding measuring stick for measuring farm animals and which can be conveniently carried in the pocket.

Poultry breeding for profitable egg production, J. B. MORMAN (*Rel. Poultry Jour., 17 (1910), No. 2, pp. 176, 177, 226–229, fig. 1; Poultry [London], 28 (1910), Nos. 1420, pp. 581, 582; 1421, p. 614*).—This article contains data on egg pro-

duction of an average of about 50 fowls kept on a town lot during a period of 3 years.

The egg yield in 1907 was 3,966 eggs, in 1908, 5,133, and in 1909, 5,511. This increase the author thinks due largely to selection of breeding stock. Emphasis is also laid on the importance of hatching pullets early enough in the season to lay eggs the following winter. Details of methods of feeding and management are given. In October, 1909, with 19 pullets and 40 hens, the former laid fewer eggs than the latter, but in November, the pullets laid slightly more eggs than double their number of hens, and in December, 19 pullets laid 241 eggs and 35 hens 95 eggs. The net profit for 1909 was $136.85.

Report on the poultry industry in Belgium, E. Brown (*London, 1910, pp. VIII+112, pls. 16*).—This is a report of a visit to the egg-producing areas and table poultry districts in Belgium for the purpose of studying Belgian methods of producing eggs and table poultry, the system of producing the famous "poulets de Bruxelles" and "poulets de lait" (milk chickens), the duck industry of the Pays d'Alost, the effect of poultry keeping on the fertility of the soil, methods of marketing, and public measures employed for encouraging the industry. There are brief descriptions of the Braekel, Campine, Malines, Brabant, Ardenne, and Herve breeds of fowl and of utility Bantams.

Poultry packers' guide, M. V. Bickel (*Mason City, Ia., 1909, pp. 51, pls. 8*).—This book contains practical information on buying, feeding, dressing, cooling, grading, packing, shipping, and marketing poultry.

Pheasant raising in the United States, H. Oldys (*U. S. Dept. Agr., Farmers' Bul. 390, pp. 40, figs. 17*).—This was prepared in response to numerous inquiries for information on pheasant raising, and presents a clear and concise account of methods used by successful pheasant raisers. The methods of obtaining the stock, managing the birds, and marketing the product are treated in detail. Different species of pheasants are illustrated and described, and there is a brief history of pheasant raising in Europe and the United States.

A chapter on diseases of pheasants by G. B. Morse is appended.

The reliable pheasant standard, F. J. Sudow (*Poughkeepsie, N. Y., 1910, 3. ed., enl., pp. 94, pls. 3, figs. 124*).—This is a practical guide on the culture, breeding, propagation, trapping, and hunting of pheasants, water fowl, and other game birds, with a few brief notes on Angora goats, rabbit breeding, and deeer farming.

DAIRY FARMING—DAIRYING.

[Dairying in Minnesota], A. J. McGuire (*Minnesota Sta. Bul. 116, pp. 391–399, 413–417, figs. 4*).—An account of the work in dairying at the Northeast substation.

In 1907 the average yield of 17 cows kept on the farm was 4,730 lbs. of milk and 222 lbs. of butter per cow. The value of the butter at 28 cts. per pound was $62.16, the cost of feed from October 15 to May 15, $29.50, leaving a net profit of $32.66 per cow, exclusive of the cost of feeding in the summer time. The yield was lowered considerably because nearly half the herd were heifers. The average yield of 9 cows for the past 3 years was 5,128.4 lbs. of milk and 253.8 lbs. of butter per cow. The methods of caring for the herd are described and suggestions are offered for advancing the dairy industry in Minnesota. Directions are given for improving the breeding stock, feeding dairy cows, making butter, and utilizing the skim milk in growing a bacon pig.

Developments in milking machinery (*New Zeal. Dairyman, 13 (1909), No. 9, pp. 53, 54*).—A brief note on a patented apparatus that can be attached to milking machines. The milk is delivered into an automatic releaser made up

of 2 buckets on a cradle that tips itself and allows the full bucket to be emptied into the milk cans. It is claimed that 1 man and an assistant with 4 machines can milk 59 cows in 54 minutes.

Estimating the cost of milk, B. W. POTTER (*Country Gent., 75 (1910), No. 2985, pp. 379, 380*).—According to the figures submitted by the author, the cost of producing a quart of ordinary milk at the present prices is 5 cts., and of certified milk 10 cts. per quart.

Variation in the composition of milk, C. J. KONING (*Chem. Weekbl., 6 (1909), No. 44, pp. 855–871; abs. in Chem. Zentbl., 1909, II, No. 26, p. 2188*).—From the results of a chemical, physical, and bacteriological examination it is concluded that aside from the variations which take place under pathological conditions the individuality of the cow and the feed given the animal are important factors to be considered in determining the causes for the variation in the composition of milk.

Abnormal percentage of fat in seven-day tests, C. H. ECKLES (*Hoard's Dairyman, 41 (1910), No. 12, pp. 420, 421*).—The author reports further data supporting his contention, previously noted (E. S. R., 21, p. 574), that a 7-day test after calving time is not a fair estimate of the production of the cow for the year. An average of about 5 per cent of fat in the milk of several cows at the Missouri Station a few days after calving decreased to about 3 per cent inside of 30 days.

The presence and significance of streptococci in milk, J. BAEHR (*Arch. Hyg., 72 (1910), No. 2, pp. 91–160, pl. 1*).—*Streptococcus pyogenes* was found in only 2 cases out of 81 samples of milk examined, and in one of these samples the milk came from a cow with a diseased udder.

S. lactis, as described by Kruse, was present in a large percentage of the samples. The results of experiments with white mice and guinea pigs indicate that ordinarily it is not pathogenic in human beings. As its source is in the litter of the stall, sanitary methods of handling the milk are necessary to prevent its spread.

The question of the nomenclature of the so-called Bacillus bulgaricus, S. MAKRINOFF (*Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 13–15, pp. 374–388*) —After a thorough review of investigations on fermented milk, the author arrives at the conclusion that *B. lactis acidi* (Leichmann), *Streptobacillus lebenis* (Rist and Khoury), *B. bulgaricus*, *Bacterium mazun*, and Körnchen bacillus are identical. The first of these is preferred by right of priority. The species is divided into two races, which may be distinguished as one produces a viscous fermentation while the other does not.

The lactic-acid streptococcus found in the Don sour milk was thought to be identical with *Streptococcus hollandicus* (Weigmann), although there was a variety of lactic-acid streptococcus obtained from the whey of a viscous fermentation which was different from the others because of its ability to grow on a meat peptone medium at room temperature.[a]

A bacteriological study of the milk of the city of Lisbon, I. BORGES and A. A. FERREIRA (*Arch. R. Inst. Bact. Camara Pestana, 3 (1910), No. 1, pp. 99–135*).—The bacterial content of 158 samples of commercial milk ranged from 73,000 to 271,000,000 per cubic centimeter, with an average of about 23,700,000. A bibliography of the literature relating to the bacteriological examination of the milk supply of cities is appended.

The distribution of bacteria in bottled milk and certain controlling factors, J. C. TORREY and A. H. RAHE (*Jour. Infect. Diseases, 7 (1910), No. 3,*

[a] Line 27 of a previous abstract (E. S. R., 22, p. 384) contains a misprint and should read "could be grown on meat-peptone media."

pp. 377–392, chart 1).—Over 90 samples of bottled milk from New York City were examined in order to study the factors which influence the distribution of bacteria in the bottle. Samples were taken with the pipette, the milk dipper, and by pouring from the bottle. The conclusions reached were as follows:

"The upper 2 oz. of the cream of fresh bottled milk of fair quality contain on the average 50 to 100 per cent more bacteria than an equal amount of the lower cream. In older and more grossly contaminated milk the lower cream may embody as many as or even more bacteria than the upper layers. By removing these two top ounces from a milk bottle and using the remaining top milk (8 oz.) for infant feeding, as Hess has suggested, there generally results a reduction of from 30 to 50 per cent in the bacterial count.

"The dominant controlling factor in the primary disposition of bacteria in a milk bottle is the upward 'rafting' activity of the fat globules. A higher percentage of bacteria are brought to the surface layers in a milk rich in cream than one poor in that substance. At ice-box temperature the rate of increase of bacteria in the cream and that in the skim milk are practically identical. As the temperature is elevated the rate of multiplication in the skim milk outstrips that of the cream until at 30° C. it may be many times as rapid. In certain samples of rather highly contaminated milk the abrupt change in the temperature of the environment from 5 to 30° C. caused a striking bacteriolysis in both the cream and the skim milk. This was probably an expression of bacterial antagonism.

"The sediment portion of the average bottle of fresh milk contains frequently fewer bacteria than any other region of the fluid. A marked excess of bacteria in the sediment indicates that the milk is old or that it has been kept in a warm place."

New and improved tests of dairy products, S. M. BABCOCK and E. H. FARRINGTON (*Wisconsin Sta. Bul. 195, pp. 3–13, figs. 5*).—Details are given for preparing and using a fat-saturated alcohol in the Babcock test. This is placed on the top of the fat in the test bottle to aid in a more accurate reading when testing cream. Readings with different test bottles before and after using the alcohol showed that the accuracy of the test was increased from 0.5 to 2 per cent.

A milk sediment test is described, which can be used for testing the different lots of milk as they are received at the factory or receiving station. One pt. of milk is poured into a cylinder and filtered through a thin disk of absorbent cotton at the bottom. This disk contains the dirt and sediment from the milk and can be dried and produced as evidence as to the cleanliness of the milk. The cylinder is kept heated by a hot-water jacket in order to facilitate the rapidity of the filtering. The success of the filter will depend largely on the texture of the cotton disk, which should be made of absorbent cotton that contains no starch or sizing. The records obtained by this test are an aid in grading milk by its dirt content, and thus furnish a basis of paying for it according to certain standards that may be agreed upon.

An illustrated description is also given of the Wisconsin hydrostatic cream balance previously noted (E. S. R., 22, p. 280).

Reduction-fermentation test, O. JENSEN (*N. Y. Produce Rev. and Amer. Cream., 29 (1910), No. 23, pp. 858, 860*).—A translation of an article previously noted (E. S. R., 22, p. 478) on the method of using the reduction-fermentation test for judging milk in paying according to quality.

The alcohol milk test, J. H. MONRAD (*N. Y. Produce Rev. and Amer. Cream., 29 (1910), No. 25, pp. 938, 940*).—This is a description of the alcohol test for determining the quality of milk at the weigh can, as the reduction and fer-

mentation tests are too slow for that purpose. This test, which is popular in Germany, is recommended by the author, who also suggests that some innocuous method of denaturing alcohol be devised so as to reduce the expense of making the test.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 241, 264, 265, 267, 268, p. 1 each*).—These relate to the adulteration of milk and cream.

Chemical alterations in butter, V. VINCENT (*Ann. Sci. Agron., 3. ser., 4 (1909), II, No. 4, pp. 269–277; abs. in Chem. Abs., 4 (1910), No. 3, p. 392*).—Analyses of butter were made before and after storage.

It is shown that a certain amount of saponification of the butter fat takes place during storage with a resulting increase of the insoluble fatty acids, and further, that soluble and insoluble volatile acids are formed by decomposition and synthesis. From this work it is evident that the glycerids of the insoluble acids are changed to a greater degree than those of the soluble acids.

Irish butter and the Reichert-Wollny standard, G. BROWNLEE (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1910), No. 3, pp. 438–458, charts 8*).—Data are reported as to 8 selected creameries which show that throughout the year the Reichert-Wollny number varied in each case with the percentage output of butter. About the beginning of the year there was a sharp rise in the amount of volatile fatty acids, though the output remained still very small. This was apparently due to the fact that milk from new milch cows was added to the milk from the cows that were still drying off, thereby raising the Reichert-Wollyn number and quite masking the lowering effect which the advanced lactation would bring about.

These figures confirm the opinion that the chief factor influencing the Reichert-Wollny number of the butter is the lactation period of the cows supplying the milk. The greater the extent to which winter dairying is carried on the less tendency there is for the butters to give abnormally low percentages of volatile fatty acids at that time. In order to get butter of a uniform composition, the calving of the cows should be distributed more evenly over the year.

The preparation of buttermilk curd, J. L. SAMMIS (*Wisconsin Sta. Bul. 195, pp. 14–21, figs. 2*).—This gives a more detailed description of making buttermilk cream, previously noted (E. S. R., 21, p. 177).

Buttermilk of 0.5 or 0.6 per cent acidity, made either from raw or pasteurized cream, is run into a steam-heated vat or starter can or placed in a pail which can be heated in a tub of hot water. The buttermilk is stirred and heated to from 75 to 78° F., when it is covered and left quiet for 2 hours, at which time the curd and whey are stirred again gently while heating to 100°. The curd grains thus formed are coarse enough to be caught on cheese cloth, where it is left to drain over night. This product is called buttermilk cream.

When it is desired to make a dry granular product resembling cottage cheese, the buttermilk is heated longer and at a higher temperature before it is put on the cloth to drain. After standing for 1½ to 2 hours at 78° the material is heated, stirring gently, to 130 or 140° and left to settle for 1 hour or longer. The higher temperature can be depended upon to kill any tuberculosis or typhoid bacteria which might have been present in unpasteurized cream. The seasoned product, called buttermilk cheese, may be sold in pasteboard ice-cream buckets or paraffined paper boxes. It is of finer grain than cottage cheese, but may be eaten in the same way or mixed with butter to form "sandwich cheese." The yield is 12 to 15 lbs. of cheese to 100 lbs. of buttermilk, according to the percentage of casein in the buttermilk and the percentage of water contained in the product.

Further investigations on cheese, P. BUTTENBERG and W. KOENIG (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 9, pp. 475–484*).—Analyses are reported of Chester, Parmesan, Kümmel, Brie, Sahnenschicht, Romadour, Margarin and many other varieties of European cheeses. The methods of making the analyses are described.

Dairy products of Montenegro, O. LAXA (*Rev. Gén. Lait., 8 (1910), Nos. 8, pp. 179–186; 9, pp. 201–207, pls. 2*).—An account of the dairy industry in Montenegro. Some cows are kept but the domesticated animals are chiefly sheep and goats.

One of the principal dairy products of the Balkan countries is skorup, which is made chiefly from the milk of sheep. The milk is heated and poured into elliptical wooden vessels, where it remains from 1½ to 2 hours. The top layer is removed and constitutes the skorup, which may be eaten fresh on potatoes and other foods. A large proportion of the skorup is salted and placed in casks, where it undergoes some fermentation, yielding a product intermediate between butter and cheese. In taste it resembles cream cheese, but varies according to the degree of ripeness. In case it is infected with molds it is much like Roquefort cheese in taste and smell. In analyses of samples obtained in different places the percentage of dry matter ranged from 70 to 85 per cent, fat from 50 to 76 per cent, albuminoids from 5.57 to 14 per cent, and ash from 1.28 to 5.87 per cent.

The native methods of making butter, cheese, and several kinds of fermented milks are described.

VETERINARY MEDICINE.

Animal experimentation: The protection it affords to animals themselves and its value to the live-stock industry of the country, V. A. MOORE (*Jour. Amer. Med. Assoc., 54 (1910), No. 11, pp. 854–859*).—The great importance of animal experimentation, particularly as related to the development of our knowledge of contagious pleuro-pneumonia of cattle, glanders, rabies, anthrax, Texas fever, tuberculosis, hog cholera, etc., is discussed at some length.

On the distribution of antibodies and their formation by the blood, L. HEKTOEN and A. J. CARLSON (*Jour. Infect. Diseases, 7 (1910), No. 2, pp. 319–333, charts 5*).—Experiments conducted with dogs are reported.

Agglutination and sero-reaction in mycoses, F. WIDAL ET AL. (*Ann. Inst. Pasteur, 24 (1910), No. 1, pp. 1–33; abs. in Jour. Amer. Med. Assoc., 54 (1910), No. 14, p. 1174*).—"It seems evident from the research and experience reported that it is possible to differentiate actinomycosis by agglutination and the fixation of complement test using for the purpose spores of the Sporotrichum; the actinomyces does not respond to the tests, but there is a generic reaction with the spors of the allied Sporotrichum. The latter can be easily cultivated and separated. The reactions also occur constantly in thrush with these spores, but there is no reaction in ringworm or aspergillosis."

On the variation of the hemolytic complement in experimental trypanosomiasis, W. YORKE (*Ann. Trop. Med. and Par., 3 (1910), No. 5, pp. 565–579*).—From experiments conducted and here reported in detail the following conclusions have been drawn:

"The results obtained confirm those of Hartoch and Yakimoff, that in most cases of experimental trypanosomiasis, a marked diminution or total disappearance of the hemolytic complement can be observed for a few hours before the animal's death. This decrease of the hemolytic complement is limited to the last stages of the disease, and is not met with in the earlier stages, even when the blood is swarming with trypanosomes. The serum of an animal in

the last stages of the disease, at a time when it contains no hemolytic complement, has no inhibitory effect upon the activating power of the complement of normal serum. The presence of numerous trypanosomes in the blood causes of itself no diminution of the hemolytic complement, and secondly it is not possible to absorb, in vitro, the complement from normal serum by the addition of numerous trypanosomes."

The seminal vesicles as carriers of infection, R. H. J. Gallandat-Huet (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 52 (1909), No. 4, pp. 477–497; abs. in Vet. Rec., 22 (1910), No. 1133, pp. 630, 631*).—Studies made of the seminal vesicles of a number of animals, including the horse, bull, ram, goat, etc., show that micro-organisms may be carried in this way by healthy animals. The secretion of seminal vesicles of animals that had died of acute septicemia was found to contain the specific organism. It was found that the virus might be transferred in the act of coition. Experiments in which the disease was artificially produced in small experimental animals showed that the virus lingers in the seminal vesicles after it has apparently disappeared from the circulation and from the parenchymatous organs.

A bibliography of 28 titles is appended.

Condemned animals and bacteria in the flesh of animals slaughtered under such conditions, A. Metzger (*Über Notschlachtungen und Bakterien im Fleische notgeschlachteter Tiere. Inaug. Diss., Univ. Bern, 1909, pp. 72*).—A large amount of statistical and other data are summarized and investigations reported regarding the character and extent of bacterial infection in the flesh of animals condemned as diseased, but which under certain restrictions may be slaughtered and sold in Germany for food purposes.

According to the author, the bacteria which may exist in the flesh of such animals and cause disease belong to the colon-typhoid group. According to his summary, 13 per cent of the condemned animals slaughtered under general methods of inspection in Alsace-Lorraine in 1907 were declared unfit for human food, owing to the possibility of bacterial contamination, and 19 per cent in Schleswig-Holstein where bacterial inspection was in force. He believes that by microscopical inspection alone a larger proportion of meat than is necessary may be withheld from sale, and recommends systematic bacteriological studies which will result in a better knowledge of the whole subject, so that the inspection may be regulated in such a way as to conform to the demands of public hygiene and yet not work undue hardship to the meat industry.

Concerning a so-called septic condition in slaughtered animals and its relation to meat poisoning and bacteriological methods of meat inspection, M. Müller (*Ztschr. Fleisch u. Milchhyg., 20 (1910), No. 5, pp. 145–157*).—From a summary and digest of data the author concludes that bacteriological studies are essential in the case of animals condemned as diseased, since where the sale of such animals as food is permitted the flesh may more or less frequently cause illness through bacterial infection of a specific character.

Notes on stock diseases of German and British East Africa and Uganda, and the resolutions of the International Veterinary Congress at The Hague, 1909, A. Theiler (*Transvaal Agr. Jour., 8 (1910), No. 30, pp. 183–197*).—A review of the present knowledge of stock diseases in these colonies.

Pseudotuberculosis in guinea pigs produced by Bacillus paratyphosus B., Dieterlen (*Arb. K. Gsndhtsamt., 30 (1909), No. 2, pp. 429–433*).—The author finds that pseudotubercular lesions of the spleen can be produced in guinea pigs through the subcutaneous injection or the ingestion of *Bacillus paratyphosus B.*

The streptotrichoses and tuberculosis, A. G. R. Foulerton (*Lancet* [*London*], *1910, I, No. 9, pp. 551–556, figs. 13; II, No. 10, pp. 626–631, figs. 5; III, No. 12, pp. 769–773, pl. 1*).—After considering in some detail the general

characteristics of the streptotricheæ and the pathology of the infections which they cause, the author deals with the evidence which is available in support of the following propositions: (1) That under the name of tuberculosis there are commonly included infections caused by more than one species of parasite; and (2) that the parasites, generally reputed to be bacilli, which are the cause of tuberculosis, belong in reality to a higher group of organisms and should as streptotricheæ be included with the hyphomycetes, or mold fungi.

Atypical generalized tuberculosis in a bullock, K. Poppe (*Ztschr. Fleisch u. Milchhyg., 20 (1909), No. 3, pp. 76–79; abs. in Jour. Compar. Path. and Ther., 23 (1910), No. 1, pp. 94–96*).—A case in which tuberculosis of the brain appears to have been primary. With the exception of a slight pleural adhesion, there was no evidence that the disease had a hematogenous or embolic origin.

A contribution to the study of the influences determining the prevalence of bovine tuberculous mastitis, S. Delépine (*Lancet [London], 1910, I, No. 20, pp. 1326–1333*).—The author considers the milk of cows suffering from tuberculous mastitis to be the most important means of transmission of bovine tuberculosis in infants.

Attention is called to the fact that cows affected with tuberculosis of the udder are in a majority of cases suffering also from more or less advanced tuberculosis of other organs. The author personally examined post-mortem the organs of nearly 100 cows affected with tuberculous mastitis, and in only one case failed to discover tuberculous lesions of internal organs. In three cases the internal lesions were limited, but in the great majority of cases they were extensive. Out of more than 300 cows suffering from tuberculosis of the udder, and examined by several veterinary surgeons, only four were reported as free from any other tuberculous lesions. Primary tuberculosis of the cow's udder would therefore appear to be of rare occurrence. Tuberculous mastitis is not common in young cows, the author estimating that about 90 per cent of the cases are over 4 or 5 years of age. From personal observations, he concludes that in about 3.7 per cent of all cows suffering from tuberculosis of any organ, the udder is affected with tuberculosis.

Up to the end of 1909, 5,360 cans of mixed milk sent to Manchester were sampled on their arrival, and 450 cans found to contain tuberculous milk. Of the cows examined clinically by the veterinary surgeon, the udders of 1,082 cows showed signs of being possibly affected with tuberculosis, and of these, 290 proved, by inoculation, to be capable of producing tuberculosis in guinea pigs. Between 1896 and 1909, 1,613 farms sending milk to Manchester were tested 4,282 times; at the first test 176 farms were found to have tuberculous cows and at the second test 238.

"The evidence obtained so far shows that bovine tuberculosis is, on an average, more prevalent in districts where stables are generally in a bad state, small or badly ventilated and dirty, and where also it is the usual practice to retain many aged cows on the farms."

The author is "led to the conclusion that bovine animals suffering from ulcerative tuberculous lesions, more especially of the respiratory organs, alimentary canal, genito-urinary organs and udder, constitute the chief factor determining the prevalence of bovine tuberculosis."

The fight against tuberculosis in Holland, A. A. Overbeek (*Tijdschr. Veeartsenijk., 36 (1909), No. 13, pp. 813–823; abs. in Ann. Méd. Vét., 59 (1910), No. 3, pp. 163–166*).—This is a review of the work which has been carried on in Holland against the dissemination of the disease by bovines.

The difference in susceptibility to cattle plague encountered among cattle and carabaos, E. H. Ruediger (*Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 6, pp. 425–451, figs. 50*).—In summing up the results of other investigations

and those here reported, it is found that cattle vary greatly in susceptibility to cattle plague. In India the cattle on the plains are resistant, while those on the mountains are highly susceptible. Philippine cattle from noninfected districts are highly susceptible and the carabao appear to be more resistant than the Batanes cattle. Cattle imported from Indo-China are highly resistant to cattle plague.

Ephemeral fever or three days' sickness in cattle, G. W. Freer (*Vet. Jour., 66 (1910), No. 415, pp. 19–22*).—A general account of this disease. Its transmission in nature is thought to be through the agency of mosquitoes. Experiments conducted with ticks have resulted negatively. Although in a large percentage of cases one attack confers an immunity for a considerable time, the author has known of numerous cases where cattle have had 2 or 3 or even 4 attacks.

Accidental parasitism of the udder, G. Moussu (*Rec. Méd. Vét., 87 (1910), No. 1, pp. 5–11, figs. 2*).—The author presents what he considers to be the first report of an invasion of the bovine udder by an animal parasite. The case reported is one in which during the course of milking small maggots appeared in the milk. These have been identified as chironomid larvæ. It is concluded that the larvæ must have entered through the milk duct.

A disease of sheep in Tasmania, J. A. Galruth (*Vet. Jour., 66 (1910), No. 419, pp. 254–265*).—An extremely fatal braxy-like disease of sheep which appears annually in certain districts of Tasmania is here described under the name of malignant transudation. It is characterized by an intense toxemia or general poisoning of the animal's system by means of the toxic products elaborated by the specific micro-organism, which has been designated as *Bacillus transudationis malignæ*. This bacillus forms resistant spores and thus is able to retain its virulence in the soil for a long period. The bacilli may gain entrance to the system of the sheep either by means of skin punctures or through abrasions in the lining membrane of the alimentary tract. It is most commonly seen during August and September, but may appear earlier in the year, and seems to be definitely associated with the spring growth of young grass.

As the common source of infection is from the ground, preventive measures consist of the destruction of carcasses and the removal of lambs from infected pastures during the danger season of the year. It has been found that sheep display no definite immunity to experimental inoculation with the specific micro-organism during the summer months.

Tuberculosis of hogs and how to control it, J. R. Mohler (*U. S. Dept. Agr. Yearbook 1909, pp. 227–238, pls. 3*).—Substantially noted from other sources (E. S. R., 19, p. 199; 20, p. 982).

Hog cholera, R. A. Craig and H. H. Madaus (*Indiana Sta. Bul. 140, pp. 127–164, figs. 12*).—This account of hog cholera and the methods of immunizing swine against it includes a report in tabular form of experimental work with cultures from the tissues of cholera hogs and blood filtrates, which has been carried on during the course of outbreaks that have occurred in Indiana in the last 3 years.

Of cultures made during 10 different outbreaks, 4 were *Bacillus coli communis*, 5 were *B. choleræ suis*, and 1 was a Micrococcus. "Eighteen of the 30 cultures made from the tissues of experimental hogs that contracted the disease by inoculation and exposure in the pens were *B. choleræ suis* and 12 were *B. coli communis*. Blood from cholera hogs collected in test tubes under proper aseptic precautions, and incubated for several weeks, showed no organisms in a large percentage of cases. These animals contracted the disease by

inoculation with cholera blood and by exposure, and the post-mortem examination showed typical hog-cholera lesions."

Of 8 hogs injected intramuscularly with *B. coli communis*, 3 became ill, 1 dying after inoculation with a cholera blood filtrate, while 5 showed no symptoms of disease, although 3 died after an exposure to hog cholera. All of 4 hogs that were fed bouillon cultures of *B. coli communis* became sick and 1 died; of the 3 that survived, 2 died on exposure to hog cholera.

Milk and bouillon cultures of a Micrococcus found in cholera blood were injected intramuscularly into 6 hogs. Of these 3 developed marked symptoms of disease and 3 became slightly ill when injected with large quantities of the culture and on exposure to hog cholera developed a fatal form of the disease. Eleven hogs were inoculated with blood filtrates from hogs having acute hog cholera, and the disease affecting the 5 hogs that became sick was proved to be hog cholera by inoculation and exposure tests.

Hog cholera and hog-cholera vaccination, M. H. Reynolds (*Amer. Vet. Rev., 36 (1910), No. 5, pp. 549–560*).—A general review of the subject presented at a meeting of the Minnesota State Veterinary Medical Association, July, 1909.

An outbreak of infectious equine nasal catarrh, I. Ökrész (*Állatorvosi Lapok, 32 (1909), No. 42, pp. 514, 515; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 11, p. 251; Vet. Rec., 22 (1910), No. 1134, p. 647*).—The author reports an outbreak of this nature which affected nearly all the horses of a squadron of hussars in the beginning of June. The disease was introduced through the horses which brought the litter-straw into the barracks, the virus apparently being present in the litter. Altogether 92 per cent of those in the barracks sickened after an incubation period of from 1 to 3 days. The disease could not be transmitted directly from horse to horse.

The treatment of colic with barium chlorid, Loewenthal (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 10, pp. 231, 232; abs. in Vet. Rec., 22 (1910), No. 1132, pp. 614, 615*).—Since 1905 the author has administered barium chlorid intravenously in 185 cases of equine colic without any of the mishaps which are said to attend its use.

"While admitting that barium chlorid should be used with some caution, on account of its cardiac toxicity, the author does not think that the cardiac danger need be very greatly dreaded, even when the pulse is rather weak and frequent. He lays stress upon the technique of the intravenous injection; and in addition to scrupulous sterility of the syringe and solution, he emphasizes the necessity of carrying out the injection very slowly. He occupies from one to two minutes in injecting the solution, and has never had a death during, or in consequence of, the injection. . . .

"He has had most brilliant results from the use of barium chlorid alone in some severe cases of flatulent colic in which the pulse had already become rather weak and frequent, the respiration was very difficult in consequence of the intestinal distension, and the visible mucous membranes were dark red to bluish-red."

The agglutination test for glanders [in Prussia], Nevermann (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 18, pp. 347–350; abs. in Jour. Compar. Path. and Ther., 23 (1910), No. 1, pp. 62–64*).—During the two years ended March 31, 1908, the agglutination test was employed on 3,466 horses. Of these, 648 were killed and 395 were found to be glandered. Of the total number, 2,085, or 60.16 per cent, showed a constant agglutinating power of 300–400 and 960, or 27.69 per cent, at 500–800. Among the horses with an agglutinating power at 300–400, there were 20, or 1.91 per cent, the first year, and only 9, or 0.87 per cent, the second, and of these, 4 were destroyed on clinical grounds. Among the animals with a permanent agglutinating power of 500–800 there were found 55 glandered animals, or 5.73 per cent. Horses with an agglutinating power of

1,000–1,200 were nearly all killed, and those with a higher agglutinating power were destroyed without exception. In the group 1,000–1,200 about 60 per cent and in the 2 groups 1,500 and 2,000 and over as many as 85 and 96 per cent were found to be glandered. It was, however, not always possible to discover lesions of glanders at the post-mortem of horses with even these high agglutinating powers.

"The total results of the agglutination test are held to indicate that this method of diagnosis is a valuable one for the early recognition of glanders, and that it is therefore valuable as an aid in the stamping out of the disease By its means many glandered horses showing no clinical symptoms of the disease whatever can be discovered. In the author's opinion, all horses showing an agglutinating power of 1,500 or over should be destroyed, and he holds that from a veterinary-police point of view it is not a serious matter that when this plan is adopted some sound animals are destroyed. It would also be justifiable to destroy immediately horses with an agglutinating power of 1,000. The animals of this group (1,000–1,200) numbered only 3.9 per cent of the aggregate tested."

Peculiar intra-nuclear bodies of the ganglionic cells in enzootic cerebro-spinal meningitis of the horse, E. Joest and K. Degen (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 5, pp. 348–356, pl. 1, fig. 1; abs. in Vet. Rec., 22 (1910), No. 1137, p. 696*).—This is a preliminary account of researches into the histological alterations of the central nervous system in horses suffering from infectious cerebro-spinal meningitis.

Small bodies intra-nuclearly situated, and distinguished by a pronounced affinity for eosin, were discovered in the large ganglionic cells of the hippocampus. "These bodies were discovered exclusively in the nuclei of the ganglionic cells; their number varied, sometimes reaching, but never exceeding 6; they are constant in shape, always being spherical. In the view of the authors these bodies can only be either the product of a special alteration of the cell or foreign bodies which have penetrated the cell and nucleus from without. Twenty-seven horses affected with infectious cerebro-spinal meningitis were histologically examined, and in 24 of these, or 88.9 per cent, the existence of these intra-nuclear bodies could be demonstrated. Two of the 3 negative cases did not appear to be typical cases of the disease. In 8 horses, which were either healthy or suffering from diseases other than cerebro-spinal meningitis, the intra-nuclear bodies were not demonstrable." While the bodies seem to represent a characteristic microscopic appearance in this disease, their etiological relation to it has not been determined.

Concerning the bacteriology of chicken cholera, L. Trincas (*Gior. R. Soc. Ital. Ig., 30 (1908), No. 9, pp. 385–396; abs. in Bul. Inst. Pasteur, 7 (1909), No. 12, pp. 523, 524*).—During the course of 3 epizootics of chicken cholera, the author isolated 3 dissimilar organisms, once the bacillus generally recognized as the cause of chicken cholera, once a coccobacillus similar to *B. coli* and near to that which Sanfelice isolated in an epizootic of pigeons, and once an undescribed species to which the name *Bacillus pseudo-choleræ gallinarum* is given. The clinical symptoms and patho-anatomical lesions were similar in the 3 epizootics.

White comb or favus of the fowl and its parasite, Sabouraud, Suis and Suffran (*Rev. Vét. [Toulouse], 34 (1909), Nos. 10, pp. 601–613, figs. 6; 11, pp. 672–688, figs. 9; abs. in Ann. Méd. Vét., 59 (1910), No. 3, pp. 177, 178; Vet. Rec., 22 (1910), No. 1131, p. 602*).—This is an account of investigations extending over a period of 6 months which were made of a chronic benign affection, situated particularly upon the comb and wattles. The parasite, which appears in no way to differ from the *Lophophyton gallinæ* described by Matruchot and Dassonville, the present authors place in the genus Achorion.

Studies on the spirochetosis of fowls caused by Spirochæta gallinarum (Somaliland virus). A property of the virus from young chickens, L. BLAIZOT (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 2, pp. 29–31, chart 1*).—A continuation of investigations (E. S. R., 22, p. 189).

The adaptation of nematode parasites to the host's temperature, L. JAMMES and A. MARTIN (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 7, pp. 418, 419*).—Investigations made to determine the temperatures most favorable to the development of eggs of different species of nematodes led the author to divide them into 3 classes, namely, those in which the embryos can only be formed at a temperature lower than that of the body of the host, those in which the embryos are formed at the temperature of the body of the host as well as at lower temperatures, and those in which the embryos are formed normally at the temperature of the host's body.

The relation of Cysticercus fasciolaris to hepatic sarcomata, BRIDRÉ and CONSEIL (*Abs. in Vet. Rec., 22 (1910), No. 1126, p. 526*).—Five of 2,000 wild rats examined by the authors were found to be affected with primary sarcoma of the liver, and 4 contained *Cysticercus fasciolaris*, the cysticercal form of *Tænia crassicollis*. In 3 of the 4 cases the cysticercus inclosed in the sarcoma was the only one found in the organs. In the fourth case one additional cysticercus was present in the liver apart from the sarcoma. The authors think that the cysticercus acts as the inoculating agent of a virus and thus indirectly causes neoplasmata.

Ratin I and II and the position of the ratin bacillus in the Gärtner group, XYLANDER (*Centbl. Bakt. [etc.], 1. Abt., Orig., 52 (1909), No. 4, pp. 455–468*).—The author found that the cultural characters of the ratin bacillus and a large number of bacilli belonging to the Gärtner group were similar and he concludes that this organism should be included in the group. Ratin II, a proprietary substance designed for the destruction of rats, claimed to be a bacterial culture, the author found to be devoid of bacteria and largely composed of an extract of squills.

The influence of copper salts on micro-organisms and their importance for disinfection purposes, P. MARTENS (*Pure Products, 6 (1910), No. 3, pp. 136–139*).—This is a brief review of the subject.

The action of morphin upon leucocytes, ACHARD, BÉNARD, and GAGNEUX (*Abs. in Vet. Rec., 22 (1910), No. 1128, p. 554*).—It is reported that when hypodermically injected morphin reduces the resistance and activity of the leucocytes for a short time. Heroin produces effects on the leucocytes comparable to those of morphin, but corpuscles acted upon by heroin retain a normal susceptibility to morphin.

Scopolamine as an auxiliary to chloroform, G. M. ILIESCO (*Arhiva Vet., 6 (1909), No. 6, pp. 375–402, figs. 15; abs. in Vet. Rec., 22 (1910), No. 1134, pp. 647, 648*).—An article upon scopolamine with special reference to its adjuvant action in chloroform anesthesia. Physiological experiments are reported.

An electrical fever recorder, A. GRADENWITZ (*Sci. Amer., 102 (1910) No. 11, p. 222, figs. 3*).—"The apparatus is based on a very simple principle, namely, the alteration in the electrical resistance of platinum wire by variations in temperature. It comprises, in addition to a coil of platinum wire, a Wheatstone bridge and a self-recording millivoltmeter. The platinum coil is either introduced into some of the cavities of the body or fixed on the body. A double conductor of low resistance connects the coil with the bridge and millivoltmeter, which records any variations in the resistance of the platinum wire, and accordingly the temperature of the body. The current required to feed the apparatus is supplied by a small storage battery of 4 volts, the gradual drop in tension being compensated for in a simple manner by means of a testing and regulating resistance, with coarse and fine adjustment."

RURAL ENGINEERING.

Experiments in supplemental irrigation with small water supplies at Cheyenne, Wyo., in 1909, J. H. GORDON (*U. S. Dept. Agr., Office Expt. Stas. Circ. 95, pp. 11, fig. 1*).—This circular presents recent results in continuation of investigations previously noted (E. S. R., 22, p. 588).

During 1909, trials were made of irrigation, summer fallowing, and dry farming in the production of field crops, and numerous trees, fruits, and garden crops were tested. The Wealthy apple proved better able to withstand adverse conditions than Winesap or Jonathan. Half the plum and cherry trees planted in 1908 died. Of the shade and forest trees tested the broad-leaf cottonwood was the only hardy survivor, but the box elder has also been found to do well. Currants withstood the winter without protection, but grew slowly, and like strawberries, blackberries, raspberries, and grapes were unsuccessful in bearing fruit.

The yield of millet on summer fallowed land was 2,031 lbs. per acre, that of barley planted in rows 8 in. apart, 10 bu., and when planted 16 in. apart, 18.8 bu. per acre. Potatoes dropped 17 in. apart in rows 36 in. apart on summer fallowed ground yielded 50.63 bu. per acre, but when dropped 17 in. apart in rows 46 in. apart the yield was 74.68 bu. The tubers were of all sizes and very scabby and unmarketable. The seed on part of each plat was treated with corrosive sublimate and formaldehyde, but no difference could be observed between the crop from this seed and from untreated seed. Wheat planted in 16 in. rows and cultivated was winterkilled seriously and yielded per acre 7 bu. of grain of poor quality, weighing 55 lbs. per bushel. Similar results were obtained with wheat planted in rows 8 in. apart.

When irrigated in the fall and spring, 2 cuttings of alfalfa produced 4,120 lbs. per acre of hay of good quality. A yield of 34½ bu. per acre of beardless hull-less barley resulted from fall watering. On 5 acre plats which received "fall or spring watering only," yields were secured of 8 bu. per acre of Defiance wheat of inferior quality, 35 bu. per acre of Swedish Select oats of good quality, 39 bu. per acre of Kherson oats, 42 bu. of potatoes, and 16.8 bu. of durum wheat. Under dry farming methods 1,000 lbs. of alfalfa, 61 bu. of potatoes, 2,440 lbs. of slender wheat grass, 2,400 lbs. of brome grass, and 11½ bu. of durum wheat per acre were secured. The alfalfa had the appearance of being winterkilled, but the potatoes were of good quality.

A series of plats was irrigated with what was considered sufficient water to produce the best results, while check plats were left unirrigated. The results are shown in the following table:

Yields of irrigated and unirrigated field crops.

Crop.	Irrigation in inches.	Yield per acre	Remarks
Barley .... bu..	6.6	42½	Excellent grade Rainfall 11 89 in.
Do .... bu .	0	16½	Rainfall 11 89 in
Millet .... lbs..	4.2	2,944	Used as a catch crop after field peas damaged by hail.
Do .... lbs..	0	737	Do
Alfalfa .... lbs..	10.8	5,000	Damaged by hail in early stages.
Do .... lbs..	0	2,100	Do
Winter wheat .... bu..	7.38	38½	
Do	0	....	Completely winterkilled
Potatoes .... bu..	8.57	140	Excellent in quality
Do .... bu..	0	63	Ground fallowed in 1908

Methods of applying water to crops, S. FORTIER (*U. S. Dept. Agr. Yearbook 1909, pp. 293–308, pl. 1, figs. 10*).—A brief review is given of the recent history

of irrigation, suggestions made for the planning and preparation of farms for irrigation, and directions given for the use of the flooding, check, basin, border, and furrow methods. Irrigation is discussed with special reference to the production of rice, alfalfa, grain, sugar beets, potatoes, and orchard fruits.

The problems of an irrigation farmer, C. S. SCOFIELD (*U. S. Dept. Agr. Yearbook 1909, pp. 197–208*).—The present status of irrigation in America, the relation between underground water and alkali, cooperative problems, and community relationships peculiar to irrigation farming are discussed. Suggestions are given for selecting and starting an irrigated farm, choosing, tilling, and marketing crops, arranging crop rotations, and using water in an economical manner.

Clearing land through the use of dynamite, A. J. MCGUIRE (*Minnesota Sta. Bul. 116, pp. 417–421*).—The advantages and limitations of the use of dynamite in clearing land are set forth in these pages and directions for removing stumps by this means given in full.

Another use for the small farm engine, H. B. BONEBRIGHT (*Gas Rev., 3 (1910), No. 4, pp. 74, 76, figs. 2*).—The use of a small gasoline engine for operating a home-made concrete mixer is described.

A constant supply of fresh water, I. G. SHELLABARGER (*Gas Rev., 3 (1910), No. 4, p. 22*).—The installation of a force pump and gasoline engine for this purpose is briefly described.

Information in regard to fabricated wire fences and hints to purchasers, A. S. CUSHMAN (*U. S. Dept. Agr. Yearbook 1909, pp. 285–292, fig. 1*).—This article discusses the proper selection of wire for fencing in farms, poultry plants, sheep pastures, etc. The author believes that a wire fence should never contain wires of lighter gauge than No. 9 or No. 10, except for poultry or rabbit fencing.

Economy of the round dairy barn, W. J. FRASER (*Illinois Sta. Bul. 143, pp. 44, figs. 42*).—This bulletin discusses the advantages of round barns for dairy farms and gives details of constructing a round barn 60 ft. in diameter, large enough for 40 cows. This is the type of barn which has been in use at the station for over 2 years and which has given satisfaction. The cost of erecting such a barn is compared with that of erecting a rectangular barn.

In the station barn, the cow stable is on the ground floor, well lighted by 16 windows. A 10-in. brick wall is carried up 9 ft. above the stable floor. This wall contains a 2-in. air space to prevent moisture from condensing on the inner wall and making the barn damp, an important point, as many barns with a solid stone or brick wall are objectionable on account of dampness. The King system of ventilation was used. To economize space and lumber the hay chute was used for a ventilator, and to economize space the milk room was located under the driveway. The itemized cost of building showed a total of $3,670.61. Other round barns are described and illustrated.

"The round barn is the more convenient, because of the unobstructed mow, which reduces the labor required in mowing hay, and because of the greater ease and fewer steps with which the feed can be gotten to the cows, owing to the central location of the supply. The circular construction is the strongest because advantage is taken of the linear strength of the lumber. All exposed surfaces are circular, and withstand greater wind pressure, as the wind can get no direct hold, as on the sides or gable ends of a rectangular barn. In round numbers, rectangular barns require, according to their construction, from 34 to 58 per cent more in cost of material than round barns with the same floor area and built of the same grade of material."

"A polygonal barn has the disadvantages of both the rectangular and the round barn, and is less stable than either. It must necessarily have a heavy

frame, which is expensive, and as the siding can not run around the corners, it is very difficult to tie the different sides together sufficiently to prevent the barn being racked by the wind."

Comforts and conveniences in farmers' homes, W. R. Beattie (*U. S. Dept. Agr. Yearbook 1909, pp. 345–356, figs. 6*).—The proper location of the house and outbuildings, the convenient planning and arrangement of the kitchen and bathroom, the water supply, sanitary requirements, protection against insects, the need for a well-arranged laundry, heating and lighting devices, and other similar topics are considered. The article discusses the subject particularly from the standpoint of the installation of conveniences in farm houses which are already built.

Conveniences in the farm home, J. J. Sprenger (*Farmer, 28 (1910), No. 17, pp. 607–609, figs. 2, dgms. 2*).—Personal experience is given in planning a farmhouse and equipping it with modern conveniences.

Rural hygiene, I. W. Brewer (*Philadelphia and London, 1909, pp. X+227, pls. 14, figs. 9*).—In this volume, which the author states is designed for a handbook of sanitation for the use of students in the agricultural schools and colleges, and for the residents of the rural districts of the United States, there are chapters on work and recreation; dwellings; schools; water; disposal of excreta; food and diet; wines, whisky, and other alcoholic drinks; milk; ice; country stores, jails, and good roads; flies, manure, and slaughterhouses; hogs, intestinal parasites; and a number of diseases and general rules regarding contagious diseases.

According to the author, it has been his intention "to discuss the various phases of life in the country from the standpoint of the sanitarian, endeavoring to point out where we depart from the standards fixed by students of hygiene and showing how these faults may be corrected."

Hints on camping arrangements for sanitary officers, R. T. Brown (*Jour. Roy. Army Med. Corps, 12 (1909), Nos. 5, pp. 544–553, figs. 6; 6, pp. 631–638, figs. 4; 13 (1909), No. 1, pp. 51–58, figs. 11*).—The location of camp sites, water supply, drainage, the protection of water supplies from infection, the disposal of refuse and waste water, the care of cooking utensils, and similar matters are considered.

About dust setting preparations, A. Beythien (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 4, pp. 189–205*).—A consideration of the various methods and preparations for preventing dust on roads and in dwellings.

RURAL ECONOMICS.

[Papers on agricultural production and resources in the United States] (*Nat. Conserv. Com. Rpt., 1909, vol. 3, pp. 3–107, 144–204, 241–268*).—This volume contains a series of articles dealing with the general topic of the development and conservation of our natural agricultural resources. The titles and authors of these papers are as follows:

Crop Yield per Acre, by V. H. Olmsted (pp. 3–8); Crop Yield and Soil Composition, by M. Whitney (pp. 9–107); Agriculture as a National Asset, by B. T. Galloway (pp. 144, 145); Agricultural Production with special reference to Crop Resources, by A. F. Woods (pp. 146–204); The Agricultural Resources of the eastern United States: Their Development and Conservation, by E. C. Chilcott (pp. 246–253); Agricultural Production as a Natural Asset, by C. S. Scofield (pp. 254–264); and The Interpretation of Crop Statistics, by A. C. True (pp. 265–268).

Methods and costs of marketing, F. Andrews (*U. S. Dept. Agr. Yearbook 1909, pp. 161–172*).—This article discusses the methods which prevail in different

parts of the United States in marketing various products, including such staple crops as cotton, wheat, and tobacco, live stock, fruits, vegetables, dairy and poultry products, etc. The different phases of marketing, which range from direct selling between producer and consumer to selling by means of from one middleman to as high as five middlemen, are described in detail and discussed with reference to their bearing on the returns secured by producers and the cost of goods to consumers.

As a general rule the costs of marketing the bulk of farm products include expenses incurred in "hauling from the farm, freight, commission for selling, storage, inspection, weighing, interest on capital, profits of various dealers, and insurance. To these may be added the losses due not only to deterioration of products after they leave the farm, but also to unequal distribution of shipments resulting in overstocked markets."

As direct marketing between producer and consumer is limited, resort is generally had by the producer to the agency of a middleman for the disposal of his produce or to cooperative selling associations. The number of these associations is shown to be constantly increasing in the United States and to be spreading into all branches of agriculture. Among the beneficial results attained in cooperative marketing have been the shipment of better grades of fruits and vegetables, and the command by the farmers of a greater influence in the markets by trading with large quantities of produce through a single individual as their representative.

Spanish farm profits, R. Frazer, Jr. (*Weekly Cons. and Trade Rpts. [U. S.], 1 (1910), No. 7, p. 313*).—The value of land according to irrigation rights, and the average cost of production and profits secured in the culture of oranges, almonds, peanuts, onions, and rice in the Valencia district of Spain are briefly discussed.

Tenure of farm lands, LeG. Powers (*Nat. Conserv. Com. Rpt., 1909, vol. 3, pp. 375–380*).—This article discusses the number, size, ownership, and occupancy of farms in the United States from 1850 to 1900 as determined from the Census reports. With reference to farm tenure in 1900 the author concludes as follows:

"The farms tilled in part or wholly by their owners were 3,712,408, and those tilled wholly by tenants were 2,024,964. For every 1,000 farm owners, tenants, and male workers other than owners and tenants over 15 years of age engaged on farms, there were 417 farm owners, 227 farm tenants, and 256 others, of whom substantially one-half worked for wages or for their parents.

"The relative number of farm owners was greater in 1900 than in 1850; the relative number of tenants was much greater in the later than in the earlier year, and has shown a tendency to uninterrupted increase, while that of the lowest form of farm labor has shown a most marked tendency to decrease in relative importance. With slight changes in the relative condition of farm work, there has been a tendency in fifty years to substitute tenant labor for slave and hired labor, and this tendency has been a most important factor in affecting farm tenure, the average size of farm land cultivated by the individual farmer, and indirectly in increasing the relative number of persons owning farm land and in decreasing the size of land owned by the average individual landlord."

[Land in the United States], G. W. Woodruff (*Nat. Conserv. Com. Rpt., 1909, vol. 1, pp. 75–93, dgms. 2*).—Statistics on the extent of the land in the United States in private holdings and reserved for public use, the different kinds of public land, and other economic data relating to the public domain are presented and discussed.

[Land occupation, live stock, land system, and agriculture in New Zealand] (*New Zeal. Off. Yearbook, 1909, pp. 443–476, 650–675, 700–726*).—Statistical returns in 1909 are presented and discussed. Of 75,152 total holdings in 1909, 21,927 ranged from 1 to 10 acres in size, 12,360 from 10 to 50 acres, and 10,206 from 100 to 200 acres, being slight increases over the number of holdings in 1908 (E. S. R., 20, p. 1090).

Farming as an occupation for city-bred men, W. J. Spillman (*U. S. Dept. Agr. Yearbook 1909, pp. 239–248*).—This article discusses the opportunities open to men brought up in cities for acquiring information about farming as an industry and of learning special features of the work, the conditions which give promise of success, and the advantages of a farmer's life.

It is deemed advisable that the city man without capital secure employment with a practical farmer with a view of learning the details of the business or take up his residence in the suburbs and begin in a small way as a gardener, by keeping a cow or two, by raising poultry or fruit, etc. Men with capital are advised to consider before investment the amount of capital required for equipment in the type of farming to be undertaken, and attention is called to the numerous sources of information now available as aids to the amateur.

The advantages of a farmer's life are briefly compared with city life and the conclusion is drawn that the "income from farming depends more upon the farmer himself than it does upon any other one factor. An intelligent man who must depend upon his own labor may live well on the farm after he has acquired a satisfactory knowledge of the business. If he can command considerable capital he may profit by the labor of others, and if his capital is large enough and he is a good business manager he may live even luxuriously. But the beginner, even with considerable capital, must be prepared to bear some hardships while he is learning the business."

Means of counteracting rural depopulation, Sohier de Bert (*Jour. Soc. Cent. Agr. Belg., 57 (1910), No. 5, pp. 131–140*).—This paper enumerates and discusses the various measures that have been put into operation by individuals interested in economic and social progress, by large landowners, and by the governments of Belgium, Holland, Prussia, Spain, France, Denmark, Great Britain, United States, Italy, etc., for making country life more attractive and landowning easier in order to prevent further rural depopulation and to encourage rural repopulation.

Among the many measures practiced in the various countries, the following are deemed advisable to improve rural conditions in Belgium: Legislation to make small proprietary holdings inalienable and not subject to seizure; the adoption of the metayer system of tenancy; the granting to farm laborers of a certain share of the products; the rehabilitation of the so-called domestic industries such as lace-making; the establishment of larger numbers of rural mutual credit banks, cooperative societies, and mutual insurance societies; the encouragement and spread of agricultural education; the reorganization of public rural policies; assistance to the poor; road improvement; and civic improvement and sanitation.

Agricultural cooperation in Montana, O. H. Barnhill (*Twentieth Cent. Farmer, 1910, No. 489, pp. 3, 19*).—This is an account of the organization in 1907 at Kalispell, Mont., of the Farmers' Protective Association and of its successful development to date. The basic idea of the society is protection to farmers through cooperation from the excessive profits of shippers of farm products and dealers in merchandise, and it conducts a cooperative grocery and general store, grain elevator, and flour mill, and markets large quantities of potatoes grown in the Flathead valley. The business of all departments of the association now amounts to $500,000 a year.

Agricultural organizations in New Brunswick, W. W. Hubbard (*Maritime Farmer, 15 (1910), No. 13, p. 372*).—A brief history by the secretary of agriculture of New Brunswick of such organizations from 1790 to the present time, with a discussion of their economic significance for the future development of agriculture in New Brunswick.

Selling and exporting associations in Italy, F. M. Ferroni (*Bol. Quind. Soc. Agr. Ital., 15 (1910), No. 5, pp. 139–143*).—This article calls attention to the great lack of cooperative selling and exporting societies in Italy as compared with many other countries: points out the natural advantages possessed by Italy for the raising of products that could be exported cooperatively, such as almonds, dried fruits, oranges, cereals, grapes and grape products, etc., as well as the difficulties which stand in the way of the development of agricultural cooperative societies; enumerates what the government has done and should aim to do in the future to encourage such organizations; gives statistical data on the results accomplished by the societies that now exist in Italy; and concludes that the increase in their number would tend to equalize prices between producer and consumer and develop the highest efficiency in Italian agriculture.

The organization of the agricultural statistical service in various countries (*L'organization des Services de Statistique Agricole dans les Divers Pays. Rome: Inst. Internat. Agr., 1909, vol. 1, pp. 445*).—The organization of the statistical service and the methods of collecting agricultural statistics in the chief countries of Europe and North and South America, and in India and Japan are discussed in this volume.

Methods of crop reporting in different countries, E. H. Godfrey (*Jour. Roy. Statis. Soc., 73 (1910), No. 3, pp. 257–283*).—This article discusses the methods of recording the progress of growing crops and of estimating areas and yields in the chief countries of Europe, the United States, Canada, Argentina, Australia, South Africa, and India.

International Institute of Agriculture (*Inst. Internat. Agr. [Rome], Assemblée Gén. Procès Verb., 2 (1909), pp. 258*).—The report of the proceedings of the second session of the institute held at Rome, December 12–18, 1909.

AGRICULTURAL EDUCATION.

The beginning of education in agriculture and home economics in North America (*Jour. Home Econ., 2 (1910), No. 1, pp. 29–31*).—A brief historical sketch is given of the farm school established in connection with the seminary founded at Quebec by Francois de Laval about 1668.

Home science [instruction] at Bozeman (*Dakota Farmer, 30 (1910), No. 1, pp. 49, 50, figs. 7*).—Work of the home economics department at the Montana Agricultural College is briefly described. An interesting feature is the preparation of a luncheon for sale to students or others, the work being arranged as a part of the course of instruction.

Farm boys' encampment, or farm school, H. G. Russell (*Nature-Study Rev., 6 (1910), No. 5, pp. 119–121, fig. 1*).—An account is given of the Grout farm encampment previously noted (E. S. R., 19, p. 390). It is stated that this summer school has become a permanent institution supported by popular subscription. A course in domestic science is now offered in addition to the work in agriculture.

Public school agriculture, T. I. Mairs (*Penn. State Col. Bul., 4 (1910), No. 5, pp. 13*).—This bulletin discusses briefly the place of agriculture in the public school, outlines high-school courses in agriculture and rural economics, and furnishes a list of bulletins, periodicals, reference books and text-books, and a list of apparatus and materials needed in agricultural instruction.

A correlated course of study in agriculture, geography, and physiology for rural schools, E. A. Cockefair (*Cape Girardeau, Mo.* [*1910*]. *pp 63*).—This pamphlet outlines a two-year course arranged by quarters for the seventh and eighth grades of the public schools, followed by 41 pages of "explanation and elaboration." The details of the course are carefully worked out and abundant references are given to agricultural text-books, standard school texts in other subjects, and Farmers' Bulletins of this Department. A considerable part of the work proposed, however, is quite definitely of secondary grade, and would seem to require much elimination and simplification for grades below the high school.

Agricultural nature study as exemplified in the school garden, F. L. Charles (*Nature-Study Rev.*, *6* (*1910*), *No. 4*, *pp. 87–92*, *figs. 2*).—The author believes that a degree of scientific agricultural experimental work can be effectively done by young pupils in the school garden.

In illustration of this he describes an experiment conducted by pupils under his direction at the Northern Illinois State Normal School at De Kalb, in which 6 varieties of radishes were tested with and without fertilizers, under such control conditions as the pupils could appreciate. As a result of these tests the pupils were able to select the most desirable variety and also to see clearly the advantages of using fertilizers. The author concludes that "children so taught may not become scientists, but they will be the more ready in later life to accept the teachings of science, and from their ranks will come its patrons."

Children's gardens for pleasure, health, and education, H. G. Parsons (*New York*, *1910*, *pp.* [*XII*]+*226*, *pl. 1*, *figs. 121*, *dgms. 6*).—Part 1 of this volume deals with the theoretical considerations favoring the use of gardening for the educational development of children. The author emphasizes its value in lessening poverty, sickness, and inefficiency, in teaching economy of time and labor, in training for other occupations and for civic affairs, and in developing a sense of the dignity of work. An important chapter is on The Pedagogy of the Spade.

Part 2 deals with the practical equipment and management of a school garden—the seeds and tools needed, the preparation of the soil, planting and subsequent work, and the functions of sunlight, air, water, and earthworms in plant growth. An entire chapter is given to the explanation of the "reasons for things," so that the teacher as well as pupil may understand the basis for the rules and suggestions given. Elementary forestry is treated in another chapter, and household industries in a third. The final chapter presents a list of books and government publications for teachers. The distinctive character of this book lies in its pedagogic attitude throughout.

How to test seed corn in school (*U. S. Dept. Agr., Office Expt. Stas. Circ. 96*, *pp. 7*, *figs. 4*).—This circular describes a simple sand-tray method of testing the germination of seed corn which can be utilized in any rural or high school, emphasizes the reasons for making such tests scientifically, and suggests some teaching relations between this work and the study of other common-school subjects.

Wisconsin Arbor and Bird Day annual, 1910, O. S. Rice (*Madison, Wis.: State Supt. Pub. Instr.*, *1910*, *pp. 111*, *pls. 6*, *figs. 15*).—The full-page plates of this annual present illustrations in the natural colors of the American bald eagle, bobolink, hermit thrush, indigo bunting, golden-crowned kinglet, and black-throated blue warbler.

Arbor Day annual, 1910: Selected books on nature study for schools and libraries, Elva L. Bascom ([*N. Y.*] *Ed. Dept. Bul. 467*, *pp. 42*).—This is a classi-

fied list of titles with a note as to the contents of each book, including works on animal life, plant life, agriculture, and the study of the earth and sky.

The farmers' cooperative demonstration work, S. A. KNAPP (*U. S. Dept. Agr. Yearbook 1909, pp. 153–160, pls. 4*).—This article sets forth the purposes of this form of agricultural extension instruction by this Department, explains its plan of organization, the incidental as well as direct teaching which it conveys, and the general value of such work in a complete system of rural education.

Proceedings of the fourteenth annual meeting of the American Association of Farmers' Institute Workers, edited by W. H. BEAL and J. HAMILTON (*U. S. Dept. Agr., Office Expt. Stas. Bul. 225, pp. 52*).—This is a detailed report of the proceedings of the meeting held at Portland, Oreg., August 16 and 17, 1909, which has been previously noted (E. S. R., 21, p. 597).

MISCELLANEOUS.

Annual Reports of the Department of Agriculture, 1909 (*U. S. Dept. Agr. Rpts. 1909, pp. 859*).—This consists of the reports of the Secretary and heads of Bureaus. The various reports are also issued as separates. A portion of the report of the Secretary, comprising a discussion of the prices of meat and other farm products, is abstracted on page 165 of this issue.

Report of the Secretary of Agriculture, 1909, JAMES WILSON (*U. S. Dept. Agr. Rpt. 91, pp. 100*).—This report, which is reprinted in abridged form from the publication noted above, contains a review of the work of this Department for the fiscal year ended June 30, 1909.

Yearbook of the Department of Agriculture, 1909 (*U. S. Dept. Agr. Yearbook 1909, pp. 652, pls. 36, figs. 36*).—This contains the report of the Secretary on the work of the Department during the year; 23 special articles abstracted elsewhere in this issue; and an appendix containing an article on the publications of this Department and how they are distributed, by J. A. Arnold; a review of the weather conditions during the year, by P. C. Day; a directory of the Department, the agricultural colleges, the experiment stations, and state officials in charge of agriculture; and agricultural statistics in which tables have been added for the rice crops of the United States from 1712 to 1909 and of the hop crops from 1790 to 1909.

Annual report of the director for the fiscal year ending June 30, 1909 (*Delaware Sta. Bul. 88, pp. 10*).—This contains the organization list and a report of the director on the work of the station, which includes a financial statement for the fiscal year ended June 30, 1909.

Twenty-second Annual Report of Louisiana Stations, 1909 (*Louisiana Stas. Rpt. 1909, pp. 31*).—This contains the organization list, a report of the director, and departmental reports on the work of each of the stations, lists of publications issued during the year, and a financial statement as to the federal funds for the fiscal year ended June 30, 1909, and as to the state funds for the fiscal year ended November 30, 1909.

Seventeenth Annual Report of Minnesota Station, 1909 (*Minnesota Sta. Rpt. 1909, pp. XXVI+431, pl. 1, figs. 158*).—This contains the organization list, a list of the bulletins issued during the year, a report of the director on the work of the station and its substations, including a financial statement for the fiscal year ended June 30, 1909, and reprints of Bulletins 110 to 116.

Monthly Bulletin of the Department Library, March, 1910 (*U. S. Dept. Agr., Library Mo. Bul., 1 (1910), No. 3, pp. 51–74*).—This contains data for March, 1910, as to the accessions to the Department Library and the additions to the list of periodicals currently received.

NOTES.

Colorado College and Station.—Under an act passed by Congress at its recent session the State of Colorado may purchase 1,600 acres of public land in Larimer County, at a price of $1.25 per acre, for the use of the college and station. In this way it is hoped to obtain considerable tracts of land in reasonable proximity to the college too broken and rocky as a whole for agriculture but containing parcels of from 1 to 4 acres at various altitudes which can be used to advantage for experimental and demonstration purposes.

Connecticut State Station.—Dr. T. B. Osborne received the degree of doctor of science from Yale University at its recent commencement.

Iowa College.—The schools section of the agricultural extension department announces, in this year's plans for the Junior Agricultural Union and Contest, that in addition to the ear-to-row test carried on last year, there will be courses of instruction and contests in general corn, oat, and potato growing, gardening, and special courses for girls in cooking, sewing, and household management. The instruction will be given largely by means of leaflets sent to members of the union at seasonable times. The enrollment in these contests up to May 25 was nearly five thousand.

Kansas College and Station.—W. M. Jardine, of the Bureau of Plant Industry of this Department, has accepted the professorship of agronomy and of agronomist in the station. T. H. Scheffer has resigned to accept a position with the Bureau of Biological Survey of this Department, and has been succeeded as assistant entomologist by L. M. Peairs of the Maryland Station. W. E. King has resigned as bacteriologist to return to commercial work, in which he will be accompanied by the assistant bacteriologist, R. H. Wilson. F. S. Jacoby has been appointed assistant in poultry work, with D. E. Schreiner, a graduate student of Cornell University, as foreman of the poultry plant.

Kentucky University and Station.—As a result of the recommendation of the committee recently appointed to reorganize the college of agriculture, a plan has been adopted whereby the agricultural activities of the university are united in a college of agriculture, to consist of the experiment station or department of research, a department of teaching (undergraduate work), and an extension department. Director M. A. Scovell has been appointed in charge of this college as director, retaining the active management of the station as well. C. W. Matthews, acting head of the college of agriculture for some time, has been appointed professor of botany and horticulture.

Maine University.—A better farming special train recently sent out made a trip of 17 days and attracted an attendance of over sixteen thousand.

Massachusetts College and Station.—The state appropriations for the ensuing year aggregate $142,000 for maintenance and $115,625 for additions to equipment and special appropriations. This is an increase in income of $37,500, of which $30,000 is for general instruction and maintenance and $7,500 for short courses. Among the special appropriations are $15,000 for the equipment of the new entomological building, $10,000 for general departmental equipment, $25,000 for repairs and minor improvements, $10,000 for an animal husbandry building, $5,000 for poultry buildings, $12,000 for an instruction

building for pomology and market gardening, especially fruit storage work, and $17,500 for additional land.

C. H. Fernald has resigned as director of the graduate school, professor of zoology, and entomologist in the station after 24 years' service, on account of advancing years, and has been appointed honorary director of the graduate school. Dean George F. Mills, of the college, has been granted leave of absence for the ensuing year on account of continued ill health. J. A. Foord has been appointed permanent head of the division of agriculture, and H. T. Fernald entomologist in the station.

Michigan College.—The establishment of a veterinary college was ratified at the last meeting of the governing board. Four-year and five-year courses are to be offered with entrance requirements the same as to other college courses. The first year and part of the second year are to be coordinate with the same years in the agricultural course.

The *M. A. C. Record* of May 3 announces the adoption of a one-year professional course for agricultural teachers, open to graduates of state normal schools in the life-certificate courses and to other graduates of reputable colleges who have had two or more years of experience in teaching. The new course requires the election of at least 75 units of the technical subjects offered in the regular four-year agricultural course. Candidates may thereafter, if they desire, secure the regular bachelor's degree in agriculture by completing the remaining subjects in the agricultural course. It is expected that this teachers' course will attract the attendance of a considerable number of students who need only technical information to become good teachers of agriculture.

A four weeks' summer course in agricultural practice opened June 20. This course is open to all students, but is designed especially for those who have not been trained to do farm work. College credits will not be given for these courses, which are considered entrance prerequisites. There will also be a summer term in forestry from June 28 to August 11, on the State Forest Reserve, and a conference of ministers at the college July 12 to 15, with lectures each forenoon by President Butterfield of the Massachusetts College and others, an open conference each day at 11 a. m., and afternoon lectures and demonstrations in horticulture and domestic science, the latter for ministers' wives.

Minnesota University.—At a meeting of the board of regents May 13, the division of forestry was detached from the college of agriculture and organized as an independent college, with Prof. S. B. Green as dean.

Mississippi College and Station.—Under a new state law a single board of trustees has been appointed for this college, the Alcorn Agricultural and Mechanical College, the State University, and the Industrial Institute and College at Columbus, taking effect July 1. The personnel of this board is as follows: G. A. McIlhenny, Forest; J. S. Sexton, Hazlehurst; B. A. Weaver, Columbus; J. A. Glenn, Starkville; T. L. Wainwright, Stonewall; I. C. Enochs, Jackson; and James Gordon, Okolona.

J. J. T. Graham has been appointed assistant chemist in the station.

Missouri University and Station.—The third county substation to be established under the Act of 1907 has been located in Lewis County near Lewistown, with E. L. Newlon as superintendent. The chief lines of work will be in testing varieties of corn, wheat, and oats, with some attention to fertilizer and soil fertility experiments.

Recent appointments include Dr. D. H. Dolley, of the University of North Carolina, as professor of pathology and bacteriology; E. J. Durand, of Cornell University, as assistant professor of botany; D. H. Doane, for several years connected with the Dairy Division of this Department, as assistant

professor of farm management; and Horace F. Major, of the Illinois University, as instructor in landscape gardening with charge of the university campus and grounds.

New Hampshire Station.—John C. Kendall, dairy husbandman of the Kansas College and Station, has been appointed director, and will enter upon his duties September 1.

Cornell University.—Legislation whereby the college of agriculture will receive during the current year an increase of $25,000 for maintenance and of $2,000 for extension work, together with $113,000 for a class room and auditorium building, $90,000 for a poultry building, and $154,000 for a home economics building, has received the approval of Governor Hughes. A significant feature of the legislation is the practical acceptance by the legislature of a systematic plan of development for the college as outlined by the board of trustees. This plan looks toward the growth of the institution during the next ten years, and if carried out will necessitate the expenditure of nearly $2,000,000 for buildings and equipment.

North Carolina College and Station.—P. L. Gainey, instructor in botany and bacteriology and assistant bacteriologist, has resigned to accept a fellowship at the Shaw School of Botany, and B. B. Higgins, instructor in biology, has resigned to accept a position as assistant in Cornell University. T. B. Stausel has been appointed assistant in soil bacteriology in the station, and Warren C. Norton assistant in botany in the college.

Ohio State University.—Lewis M. Montgomery has been appointed assistant professor of horticulture, and Thomas D. Philips assistant in rural economics.

Oregon College.—The twenty-fifth anniversary of the establishment of the institution was celebrated June 10 to 18.

Texas College and Station.—John M. Green has resigned from the board of directors and has been succeeded by James Cravens. H. L. McKnight has been promoted from assistant agriculturist to agriculturist of the station. The office of vice director has been abolished.

Wisconsin University.—The formal dedication of the new forest products laboratory took place June 4, Forester Graves, of this Department, President C. R. Van Hise, of the university, Governor J. O. Davidson, and ex-Governor W. D. Hoard participating in the exercises. The laboratory is a three-story brick structure, trimmed with white sandstone, erected by the university at a cost of $75,000 and equipped by this Department for a like sum. Courses in wood technology and the mechanical engineering of wood manufacturing plants are to be added to the university curriculum next year, the college of engineering cooperating with the staff of the forest products laboratory in the instruction.

A New School of Agriculture in Vermont.—Announcement is made that a secondary school of agriculture for Vermont boys is to be opened next September in connection with Lyndon Institute, Lyndon, Vt. A two-year course in scientific and practical agriculture will be given, designed to prepare young men for successful farming under Vermont conditions. The course will extend over 9 months of each year and will be open to residents of the State eligible for admission to any approved high school.

A unique feature of the school is the provision of two methods by which students may pay their expenses, a cash payment system and a work payment system. Boys who choose the latter method will be required to stay at the school throughout the year and will be allowed $25 a month with board and lodging during vacation time and 15 cents an hour for work during the school year.

The establishment of the school has been made possible through a gift of Theodore N. Vail, President of the American Telegraph and Telephone Company, who has associated with him as an advisory committee the following persons: Ex-Governor Fletcher D. Proctor, President John M. Thomas of Middlebury College, President W. D. Gibbs of the New Hampshire College, Dean J. L. Hills of the University of Vermont, State Superintendent of Education Mason S. Stone, and John W. Titcomb of Middlebury, Vt. The director of the school will be Arthur W. Merrill, a graduate of the New Hampshire College, and for several years teacher of agriculture at the Baron de Hirsch School.

Maryland State Normal School for Negroes.—The Maryland State Board of Education, in accordance with an act of the general assembly in 1908, has selected a farm of 178 acres near Bowie, on the Pennsylvania Railroad between Washington and Baltimore, as a site for a new state normal school for negroes. Instruction is to be given in mechanic arts, trades, agriculture, and domestic science, as well as the common school branches. George H. C. Williams, principal of the Montgomery County Agricultural School at Sandy Spring, has been appointed principal of the new normal school.

New Journals.—*Bulletin of Entomological Research* is being issued at London by the Entomological Research Committee of Tropical Africa, with the scientific secretary, Guy A. K. Marshall, as editor. The initial number contains an introductory statement regarding the work of the committee (E. S. R., 21, p. 696), a list of collections received, and the following original articles: A New Genus and Two New Species of African Fruit Flies, and A New Species of Cordylobia, by E. E. Austen; Notes on the Blood Sucking Diptera Met With in Eastern and Southeastern Abyssinia, by R. E. Drake-Brockman; Notes on Two West African Hemiptera Injurious to Cocoa, and On the Parasites of Two Species of West African Wild Silkworms, by G. C. Dudgeon; The Study of Mosquito Larvæ, by W. M. Graham; On Scale Insects (Coccidæ), Etc., from the Uganda Protectorate, by R. Newstead; and On the Larval and Pupal Stages of West African Culicidæ, by W. Wesché.

L'Egypte Contemporaine is being published bimonthly at Cairo as the organ of the Khedivial Society of Political Economy, Statistics, and Legislation, with Germain Martin as editor in chief. Considerable attention is given in the initial numbers to agricultural questions, such as mutual insurance and credit societies in Egypt, the progress of agriculture in France during the last fifty years, agricultural syndicates in Egypt, the culture of sugar cane and cotton in Egypt in their economic relations, and the manufacture of fertilizer in Cairo.

American Farming and Farm Implements is being published at St. Petersburg in the Russian language, as a semimonthly devoted to the purpose of familiarizing Russian landowners and others with American methods of farming and American implements and machinery. The initial number contains an article on the activities of governmental and other agricultural institutions in this country, dealing especially with the extension phases.

Alianza Cientifica Universal is a monthly, published at Durango, Mexico, as the organ of the sectional committee for the State of Durango. It is under the directorship of Prof. Isaac Ochoterena, who contributes an extended article to the initial numbers on the native vegetation of the State.

Kolloidchemische Beihefte is to be published at irregular intervals under the editorship of Dr. W. Ostwald, at Dresden, as a supplement to *Zeitschrift für Chemie und Industrie der Kolloide*. It is to be devoted to monographs on pure and applied colloid chemistry.

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EXPERIMENT STATION RECORD.

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Among the subjects of educational discussion at the present time, in teachers' conventions, in professional journals, and in the public press, there is probably none more prominent than the questions connected with the teaching of agriculture in the public schools. This interest centers chiefly in the high school and the place which should be assigned to agriculture in its curriculum. The relations of the subject to other science studies, whether it should be taught at the beginning or toward the end of the course, and the entire question of its proper pedagogical setting, are included in the discussion. Such interest justifies a somewhat detailed consideration of the advantages which agriculture offers as a study introductory to other lines of science work in the high school.

No one who has studied high school courses in the last two decades will have failed to note the growing demand for a more consistent organization of the work in science. It is increasingly recognized that the educational results of science teaching are not all that was hoped or predicted from its introduction into the curriculum. And the failure to achieve ideal results has been attributed largely to the want of a well-perfected method of teaching. It is generally admitted that a large part of the superior culture and disciplinary value claimed for mathematics, history, and the classics, is due to the advantage derived from the excellence of the teaching method through which they have been presented to successive generations of high school students. Science has suffered from the lack of this pedagogical organization and presentation of its subject-matter, and has not yet come fully into just comparison with the older subjects in this respect.

Probably the most striking defect of the science curriculum is its lack of proper gradation and coherence. The prevailing tendency has been to present in successive years a variety of loosely related subjects no one of which is definitely planned to be a preparation for those that follow. The futility of such a course has recently been vividly parabled by Dr. John Dewey in the following hypothetical history of language study in the later seventies and eighties

of the nineteenth century. He says: "Each of the three terms of a year was devoted to a language. In the first year Latin and Greek and Sanscrit were covered; in the next, French, German, and Italian; while the last year was given to review and Hebrew and Spanish as optional studies."[a] Yet good authorities state that this impossible description very accurately represents the present conditions of science teaching.[b]

An examination of a large number of high school courses will disclose the fact that there is a close approach to uniformity in the policy of placing chemistry and physics in the last two years. This has been done largely in deference to university requirements and to the economic advantage of deferring expensive laboratory equipment to the years when classes are certain to be comparatively small. There is nothing inherent in the subjects themselves, when freed from collegiate impedimènta, that requires this postponement.

Examination of the earlier years of the usual high school course shows that the first-year work in science has come to be fairly well standardized, as either physiology, physical geography, botany, zoology, biology, or some combination of two or more of these. Latterly domestic science has begun to appear in the first year, and in still fewer instances "general science" and agriculture. Zoology appears almost invariably after botany when the latter is taught in the first year, or along with that subject in the second year. In 43 Illinois schools recently noted, domestic science or domestic economy appears somewhat more frequently in the second year than in the first, and agriculture is usually continued from the first, or else appears for the first time in the third year. In only one of these schools does physics appear in the second year; and in one other case elementary chemistry stands in this year combined with domestic science.[c] Geology appears only four times in the list, once in the third year and thrice in the fourth. Astronomy appears seven times, once in the third year and six times in the fourth (in one case combined with geology). Chemistry stands eighteen times in the third year, and physics twenty times. In the fourth year chemistry appears twenty-three times, and physics eighteen times, with an additional alternative between chemistry and physics in one school.

A rapid survey thus shows a more stable placement of chemistry and physics in the last two years than of any other science subject in the first two. In a general way the first-year science work in the high school is less fixed than that of the second. The appearance of general science, biology, domestic science, and agriculture in the first

[a] Science, January 28, 1910, p. 124.
[b] School Science and Mathematics, May, 1910, p. 377.
[c] Ibid., p. 375.

year seems to be evidence of a growing attempt to remedy this condition and make the science work of this year more consistently introductory to that which follows. In the case of at least three of these subjects there is a suggestion of appreciation of the value of supplying in the first year a practical motive through which to enlist the student's interest in the later subjects. And herein seems to be the beginning of a valid pedagogical arrangement of the science subjects in the high school.

One great desideratum in science, as in all other school subjects, is such a presentation of the subject-matter as will best appeal to the student's personal interest in the further pursuit of the study. And such an arrangement would properly take the place, if necessary, of any logical or merely economic arrangement of subjects from the standpoint of school convenience or expense. In short, it should take the place of any arrangement whatever of subject-matter which the student ought to like but does not in fact.

Physical geography, physiology, hygiene, or biology, as being the study of real life or its conditions, ought to be interesting to all first-year high school students. Common observation, however, shows that these subjects generally fall short of developing such interest. Even "general science" usually fails to supply an economic motive to further study, though it has some advantages in developing a taste for further investigation in pure science for the sake of culture or general information.

In contrast with these facts, experience has already shown that domestic science, the mechanic arts, and agriculture, as first-year high school subjects, do furnish an almost compelling motive to further scientific study for the sake of information that can be used, either for the betterment of the individual or of the race. The proof of these results can be seen, of course, only in actual observation of the teaching of these subjects, but the reasons for the appeal which industrial study makes to the student's interest are not difficult to understand, and the practical teaching advantage of approaching science study through this means of motivization will become increasingly evident as courage is found to depart from the present irrational sequence of science subjects in the usual high school course.

The basic materials of civilized life come from the earth, and are chiefly the products of agriculture. Their elaboration, manufacture, and dissemination is the business of the mechanic and commercial industries. Their actual use, and all the multifarious interests and activities of mankind—social, political, and educational—are resultants of the racial instinct of home making. Considered in its comprehensive sense, as an art, a science, and a mode of life, agriculture embraces some phases of all the other activities; but considered merely

in its scientific and productive aspects, it constitutes an almost ideal introduction to high school science work.

To specify more particularly, agricultural study calls for some definite knowledge of geology, physical and commercial geography, botany, zoology, physiology, chemistry, history, manual training, arithmetic, and bookkeeping. Practically all of these subjects are now taught in the schools, but few if any of them, language-study included, carry their own motive to the student's interest. Taught mainly as distinct subjects, they are naturally considered as having indifferent relations or none to each other, and the student fails to perceive any clear unity of purpose or principle of valuation in his school work. But the study of agriculture, in a natural, unforced way, so draws upon all these subjects as to discover to the student their educational values and inter-relations. The pupil who becomes interested in agriculture as the great basic industry of the race finds himself under the necessity of studying its included subjects as a means of understanding the essence of agriculture itself. In the words of President Buckham, "Agriculture is not a simple science, but a group of sciences, each of which is linked with all the others, so that you can not know even a little of one without knowing something of others."[a]

To illustrate this for the schoolroom: A lump of soil takes the student at once to the fundamental earth-science, geology. In its present condition this soil is the result of weathering and decomposition—physical geography. It is composed of certain material elements each related to the others and with its fertility—chemistry. Its fertility is evidenced by its ability to produce plants—botany. Plants require water as the solvent and carrier of their food materials, and this soil-water moves to the organs of the plant by gravity, capillarity, and osmosis—physics. An important function of economic plants is to serve as food for animals—zoology. The processes of food assimilation in plant and animal bodies bring us to physiology. And the return of plant and animal residues to the earth for another cycle of modifications brings us face to face with the whole philosophy of natural law. Furthermore, the production, transportation, and exchange of food supplies and the materials of clothing and housing is the essence of history-making. It involves the original necessity of language-study, manual training, mathematics, and science itself. Civilization is thus seen to be the ultimate and logical product of agriculture and its subsidiary arts and sciences.

This is not an invented device of argument or artful presentation. The sequence of relations embraced in agriculture as a central sub-

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[a] An address to students of the winter course, University of Vermont, January 5, 1910, on Agriculture in the High School.

ject of interest inheres in the nature of the subject itself and in the facts of human experience. This is sufficient explanation of its commanding appeal when properly presented to school students. And the effectiveness of the appeal is not strictly confined to any prescribed order of presentation. It is, in fact, doubtful whether a specific study of the soil is the best method of approach. Perhaps animal life, undissected, has the strongest initial interest for most students, and it is just as easy and as logical to go from the horse and its uses to mankind back to the soil and "the original Vermont plow,"[a] as to follow the reverse order. It is the peculiar advantage of agricultural study that it has by nature these facile "openings" into almost every other subject of school interest or of philosophic contemplation.

Much has been said in the last year or two concerning a "redirection" of the rural schools, and by implication of many of the urban schools as well, and the need of such redirection to the effective carrying out of the fundamental purpose of public education is quite generally conceded. Here again the usefulness of agriculture as a school subject becomes apparent in that it can bring about a large reformation of the curriculum without the necessity of completely reconstructing it, while supplying at the same time an effective means of correlating many other subjects of study. This advantage has been well set forth in a recent educational discussion as follows:

"A portion of agricultural or industrial practice can be expressed in mathematical form, the study of history may take the form of the industrial and economic development of a nation, geography can be taught in terms of environment, science in its relation to the great industrial processes upon which the lives of the people depend. I can conceive of an elementary school in which no so-called agricultural courses exist, yet which will still present the subject vitally from day to day by means of the customary studies and exercises. I would not isolate industry or agriculture in the elementary school from this environment of life in order to teach it. I would teach the entire environment. This will give the best training regardless of any future environment. Real and lasting progress in industrial education will be made only when all schools—industrial or otherwise—concern themselves with the needs of human life; and in so far as industrial education tends to vitalize by its example the whole school system, so will its effectiveness be beyond dispute; and no state policy will be complete unless it keeps this end in mind."[b]

With such an attitude and such teaching in the lower grades, a definite agricultural course in the high school, as an elective open to

[a] That is, the forces of glacial action. See President Buckham's address.

[b] Arthur D. Dean in Journal of Education, December 30, 1909.

all students on a parity with the other humanities, would not long be regarded as strange and unwarranted. And the first year of such a course, if equivalent work has not been done in the lower grade, could well be made to serve as the introduction to all the other high school sciences. So much of agriculture as is embraced in this first-year-science conception should be known to every student, boy or girl, in every other high school course, as a matter of general intelligence, information, and culture. Though the high-school girl be destined to live her life in a city home, perhaps never to work with her own hands, saneness of educational ideal requires that she should at least know the source-materials of her daily bread and means of shelter.

Equally, the future man of any occupation should be educated to the understanding of the fundamental relation of agriculture to all other industries and vocations. At least one year's work in distinctive domestic science and household economy for every girl should accompany this first year's work in general agriculture. Either line of these industrial sciences could then be systematically developed from this introduction for those who wished to elect the distinctive agricultural or domestic courses, and with such motived introduction the high school course in general science could be economically, rationally, and pedagogically presented in the remaining years of the course. Agriculture is not merely "general science" but general science with visualized, practical application as an educational inducement to its undertaking and fullest prosecution. Once the boy or girl can clearly see that such study actually relates himself and all the other school subjects to the practical affairs of real family and world life, we may expect him to remain in school so long as conditions permit him therein to cultivate and enlarge the field of his own personal interest in self-education.

It has been incidentally suggested in this discussion that agriculture may be used as first-year science work as early as the seventh grade, and continued in the eighth. The advantages of such a plan deserve more than incidental reference.

There is nothing sacred in the usual eight-year and four-year grouping of elementary and secondary instruction. Its faithful following is doubtless responsible for much of the "elimination" of pupils which commonly occurs between grammar school and high school. The six-year division of the curriculum is just as logical and far more psychological and pedagogical, and this division point is definitely favored by the best modern educational thought.

The following brief quotations bear out this point. Dean J. E. Russell says: "A fundamental course of six years, at once cultural and preparatory to the widest possible range of differentiated courses beginning with the seventh grade, is the chief desideratum of our

American school system."[a] And in the words of another: "If we persist in our inexcusable failure to provide such variations during the last years of our so-called elementary course, when individual differences appear with unmistakable and increasing force, we may expect boys and girls to continue, as they do now, to seek in the more tolerable occupations of street, factory, shop, office, and mercantile house, the kind of interests for which they feel an instinctive though vaguely defined need."[b]

This is to say that beginning at about the thirteenth year the economic interests and ambitions of youth begin to assert themselves. The time is then ripe for an educational appeal that may win these students to the continuation of a school course which recognizes the natural inclination of this period and trains to a broader social usefulness. It is already evident that elemental agriculture preeminently possesses the means for making such appeal highly effective. And if the usual high school work in science, history, and language is thus prepared for in the lower grades, the last four years of the secondary course can be much more fully utilized than now for intensive, purposeful study. The school and the student have the right to expect these conditions from each other.

Before any adequate summation of the advantages of agriculture as introductory science study can properly be presented, a word should be said in reference to agriculture as applied science. One of the criticisms that has been offered upon the introduction of agricultural courses in the high school is the fact that it has so frequently been done without articulating the subject with the existing courses in pure science. And with particular reference to domestic science and agriculture it has been declared: "Before a pupil enters upon a course in an applied science, he ought to have received training in scientific method and habit of thought by studies in pure science, preferably, of course, in those sciences which underlie the applied science in question. Thus chemistry and botany at least should precede or accompany domestic science courses, and all the biological and physical sciences are necessary to adequate teaching of agriculture."[c]

This doctrine is doubtless entirely sound with reference to advanced and technical courses in agriculture and domestic science, but it is not a good argument for postponing all consideration of applied science until students have abandoned the schools for lack of such incentives to study. Pure science has little hold upon the interest

[a] Dean James E. Russell, in the Educational Review, December, 1909.

[b] Principal J. D. Burks, in Proceedings of the National Education Association, 1909, pp. 294–296.

[c] School Science and Mathematics, May, 1910, p. 378.

of the boy or girl who does not approach it through compelling curiosity as to its actual or possible applications. "What's the *use?*" is the attitude of most of those who quit the schools as early as the law allows.

Agriculture *can* be taught in a way that is adequate to the interests and abilities of seventh and eighth grade students, and in the teaching also develop an interest in all its related subjects strong enough to discover something of their personal values to the learner. It is suspected that it might even lead the teacher to perceive new values in some of them, and thus help toward a wiser discrimination between the important and the unessential in subject-matter to be taught. In short, the pre-eminent advantage of agricultural study in the lower grades is that it discovers to the student concrete, embodied applications of scientific facts and principles with which he desires to become better acquainted. It is certainly unpedagogical to bring the subject into the curriculum without appreciating and utilizing its strategic importance in conserving and developing the will to know.

The claims of agriculture for use as introductory and coordinating science, and its advantages for this purpose over any other subject thus far tried or proposed, may then be summarized as follows:

(1) It inter-relates not only the various special sciences but also many other subjects of school study, and thus tends to put the student in harmony with a systematic educational programme.

(2) It offers the most serviceable basis for a prompt yet conservative redirection of public school work through a wiser pedagogical organization of the curriculum.

(3) It provides an interesting form of laboratory work and field observation at the beginning of the high school course, thus demonstrating at the outset the fundamental importance of investigational evidence in all science work.

(4) It supplies an economic as well as a cultural motive for science study, and thus allies itself with the spirit of modern educational thought and appeals most effectively to the personal interest of a majority of students.

(5) It tends to develop in the student the ability to make a wise choice of personal vocation by bringing the basic industry of farming into conscious comparison with what he knows of other attractive professions and occupations.

(6) It explains and illuminates the [illegible] conditions of his own environment and daily life, [illegible] rationalizing the student's experience and in fitting [illegible] social cooperation in the betterment of commun[illegible]

(7) It encourages the habit of discovering [illegible] the culture value of every useful subject of study by enlarging the basis of

the student's powers of judgment through a broad and sympathetic comprehension of basic social interests.

If this outline of great expectations should seem extravagantly broad, it should be remembered that agriculture, though taught in upward of four hundred and thirty public high schools and academies in this country, is yet in its infancy as a high school subject. It is not to be compared with any other present-day addition to the traditional programme of the three R's which lacks its fundamental relation to life. It is more than fulfilling its early promise wherever put on trial under wise direction, and it goes far toward satisfying the demand for an education that is visibly related to the real life of the individual and the community, a demand that will sooner or later enforce itself upon the schools.

Those who would deprecate the consequences of a narrow bread-and-butter type and policy of vocational instruction should be the first to welcome a real and rational integration of agricultural science with the high school curriculum, in a way that may serve to reinforce and vitalize the old-time studies that ought to survive in our modern educational evolution.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Annual reports on the progress of chemistry for 1909, edited by J. C. CAIN (*Ann. Rpts. Prog. Chem.* [*London*], *6* (*1909*) *pp. 283*).—This report contains a summary of the more important advances in general, physical, inorganic, organic, stereo-, analytical, physiological, and mineralogical chemistry. There are also chapters on vegetable physiology and radioactivity.

The chemistry of milk and dairy products for the year 1908, M. SIEGFELD (*Chem. Ztg.*, *33* (*1909*), *Nos. 97, pp. 865, 866; 98, pp. 869–871; 99, pp. 878–880*).—This is a retrospect of the more important advances in milk and dairy chemistry during 1908.

Report on the progress of milk chemistry and dairying for 1909, GRIMMER (*Milchw. Zentbl.*, *6* (*1910*), *No. 3, pp. 97–113*).—This is a retrospect of the more important advances in the chemistry of milk and dairy products for the second half of the year 1909. See a previous note (E. S. R., 22, p. 114).

About carbenzym, E. FALK and A. STICKER (*München. Med. Wchnschr.*, *57* (*1910*), *No. 1, pp. 4–7; abs. in Biochem. Zentbl.*, *9* (*1910*), *No. 17, pp. 767, 768*).—The authors' results indicate that trypsin is not rendered inactive by charcoal, and that charcoal is not an antiferment. They are inclined to accept Hedin's views (E. S. R., 22, p. 608) that charcoal has only the property of fixing the enzym and that it can be easily liberated providing the proper solvents are used. The enzyms absorbed by animal charcoal require casein as a solvent, while trypsin which is absorbed by vegetable charcoal can be easily liberated and extracted by other protein solutions. Plant charcoal showed the greatest capacity for absorbing enzyms and antienzyms. On the basis of these findings the authors prepared the product known under the term "carbenzym."

A theory of oxydase reactions. Manganese and iron-free oxydases, A. BACH (*Ber. Deut. Chem. Gesell.*, *43* (*1910*), *No. 2, pp. 364–366*).—The author concludes from his work with *Lactarius vellereus* and *Russula delica* that the presence of manganese and iron compounds is not altogether essential for oxydase reactions.

A rapid method for extracting and purifying plant oxydases, A. BACH (*Ber. Deut. Chem. Gesell.*, *43* (*1910*), *No. 2, pp. 362, 363*).—A description is given of a fractionation method for working up plant extracts which contain pectins and gummy matter. It consists of treating the plant extract, which contains 5 to 10 per cent of magnesium sulphate, repeatedly with alcohol and collecting the various fractions. A feature of the method is that very little alcohol is required for the operation.

The nitrogen and ash constituents of some ornamental plants, A. HÉBERT and G. TRUFFAUT (*Bul. Soc. Chim. France*, *4. ser.*, *7* (*1910*), *No. 1, pp. 31–37*).—Analyses are given of about 60 species of ornamental plants in which the dry matter, total nitrogen, and ash were determined.

Some organic bases in cabbage (Brassica oleracea), K. Yoshimura (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 5, pp. 253–256*).—Investigations with *B. oleracea* showed that 28 per cent of the total nitrogen exists as protein nitrogen and 71 per cent as nonprotein nitrogen. One hundred gm. of fresh cabbage yielded 1.4 gm. of arginin, 0.4 gm. of lysin, 0.6 gm. of cholin, and 0.2 of betain. Histidin was also present.

Contributions to the chemistry of whortleberries and cranberries, C. Griebel (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 5, pp. 241–522*).—From the results obtained with the small and large cranberry and the whortleberry it is concluded that they all contain benzoic acid, both free and combined in an ester-like glucosid, "vacciniin," which can be easily hydrolyzed by potassium hydrate.

In whortleberries the free benzoic acid content varied between 0.054 and 0.144 per cent, whereas the cranberries contained from 0.011 to 0.041 per cent. The total benzoic acid in the whortleberries was 0.088 to 0.224 per cent, and in the cranberries from 0.021 to 0.061 per cent. Both the free and the combined benzoic acids are formed only during the ripening process, becoming greater as the ripening process goes on. The ratio of free and combined benzoic acids changes when the pressed berries or juice are kept under normal conditions or in the cold, as a portion of the free acid is esterfied. Aside from the benzoic acid content, the whortleberries differ from the other two berries in that they contain more sugar and less pectin bodies and acids.

A study was made of the "vacciniin" from the whortleberry.

About oleuropéine of olives, E. Bourquelot and J. Vintilesco (*Jour. Pharm. et Chim., 7. ser., 1 (1910), No. 6, pp. 292–301*).—This is a study of oleuropéine, previously noted (E. S. R., 20 p. 831), showing the results after treating the fresh and dried olives with invertin and emulsin. A special effort was made to examine the fresh olives 2 to 3 hours after receipt.

The results show conclusively that oleuropéine is present in both the fresh and dried olives, and that the content of the glucosid decreases with the age of the olive. The sugar formed by hydrolysis with emulsion is probably dextrose.

Simple or mixed glycerids in butter fat, M. Siegfeld (*Milchw. Zentbl., 6 (1910), No. 3, pp. 122–127*).—From the results it appears that butter fat consists of a mixture of glycerids and the author assumes that this is the case with other fats.

The effect of light and air on butter fat, A. Nestrelajew (*Milchw. Zentbl., 6 (1910), No. 1, pp. 1–8*).—Samples of butter were placed near a south window and exposed for 107 days to the influence of light and air.

During this period it was noticed that the samples took on weight, the rate of increase being proportional to the time of exposure. A period of 8 to 14 days was necessary to blanch the butter.

The chemical changes taking place were as follows: The Reichert-Meissl and Polenske numbers, the Koettstorfer saponification number, and the middle molecular weight of the nonvolatile fatty acids were increased, while the Hehner number, the Juckenack-Pasternack difference, the iodin number, and the refractometric figure became lower. From the results as to the iodin number and refractometric figure it is concluded that oxidation of the fat took place. The glycerids of the fat were decomposed into glycerol and free fatty acids (saturated and unsaturated), the latter yielding bodies which are easily oxidized and by dissolution of the double combinations are split into two or more acids of lower molecular weight. The more unsaturated acids the butter contains the greater is the tendency of light and air to bring about chemical changes and increase in weight.

Enzym-chemical studies of Edam cheese ripening, W. Van Dam (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *26* (*1910*), *No. 6–7, pp. 189–222, figs. 3; Rev. Gén. Lait, 8* (*1910*), *Nos. 4, pp. 73–83; 5, pp. 97–107; 6, pp. 121–131; 7, pp. 145–155; 8, pp. 169–178, figs. 3*).—These investigations pertain chiefly to the rôle played by rennet in the ripening of Edam cheese and the degree of acidity of the cheese mass.

The results of the work indicate that a distinction must be made between the potential degree of acidity (determined by titration) and the real degree (which is found by measuring the hydrogen ion concentration) of the cheese, and that the free acid as determined by various authors does not give the true hydrogen ion concentration. The hydrogen ion concentration of Edam cheese was found to range between 0.72 and 1.1×10^{-5}, which shows the acidy to be much less than was previously supposed. Controlling the acidity by the electrolytic conductivity method showed that when on the press the formation of lactic acid has almost reached its extreme limit, and further that fermentation is hardly noticeable in the press during the first hour, when it suddenly shows manifestations of activity.

In regard to the part played by rennet in the cheese ripening process, it is shown that a prepared paracasein calcium preparation was easily digested by rennet and that this rate of digestion is proportional to the amount of hydrogen ions present. When various rennet preparations were allowed to act on the paracasein calcium preparation at the same degree of acidity the rates of digestion and coagulation were parallel. Calves' stomach extract (prepared according to Hammarsten's method of weakening the peptic activity with magnesium carbonate) when allowed to act on paracasein furnished the same results, showing that paracasein is digested only by chymosin, and that no true reason exists for suspecting the presence of a definite casein enzym in rennet. Digesting the calves' stomach infusion with 0.2 per cent hydrochloric acid solution also destroyed the cheese digesting property, even with an acidity concentration of 1.4×10^{-5}. The peptic digestion with ordinary rennet was always far behind that of the chymosin digestion. Salt was found to accelerate the digestion of paracasein by chymosin.

The dissolving of the casein, it is shown, does not go on until all the paracasein is digested, there being rather a state of equilibrium maintained at a certain concentration of the cleavage products (peptones and caseoses). Chymosin digested the paracasein of aseptic milks, and in cheeses which was stored from 1½ to 4 and 8 months the same amounts of soluble nitrogenous substances were present. Here, also, an equilibrium of the concentration of the water-soluble nitrogenous constituents was present.

From this it is concluded that in the cycle of the ripening process the chymosin first breaks up the paracasein, and that under normal conditions the process would then cease were it not for bacteria or bacterial enzyms which have the power of breaking up these products still further into products which give the cheese the characteristic taste and odor. This process again destroys the equilibrium and thereby the solution of the casein can take place anew. From a chemical-dynamic viewpoint the formation of soluble nitrogenous compounds in Edam cheese therefore takes place quickest at the earliest stages of the process and in consequence of the accumulation of caseoses and peptones becomes less as the process goes on. For cheese of various ages a nearly constant quantity of these cleavage products is found, whereas the increase of water-soluble nitrogenous compounds slowly progresses.

The colors employed for foodstuffs, A. Gautier et al. (*Ann. Falsif.*, *3* (*1910*), *No. 17, pp. 81–87*).—A critical discussion of the various colors employed in the manufacture of foodstuffs.

Agricultural-chemical methods, E. HASELHOFF (*Agrikulturchemische Untersuchungsmethoden. Leipsic, 1909, pp. 152; rev. in Naturw. Rundschau, 25 (1910), No. 13, p. 167*).—A small but comprehensive volume, containing chapters on the examination of soils, fertilizers, feeding stuffs, seeds, plant ashes, and milk and dairy products.

The microscopical examination of drugs, foods, and textile fabrics, A. SCHNEIDER (*Merck's Rpt., 19 (1910), No. 3, pp. 61–63, figs. 7*).—This is a description of the microscopical characteristics of powdered vegetable drugs, spices, cocoa, tea, coffee, and textile fabrics.

Kjeldahl determination for nitrogen, C. NEUBERG (*Biochem. Ztschr., 24 (1910), No. 3–5, pp. 435, 436*).—The author draws attention to the fact that a great many beginners when liberating the ammonia from the amidomercuric-sulphate ($Hg(NH_3)_2SO_4$) employ too little alkali. On adding the sodium thiosulphate a portion of the sulphuric acid contained therein is liberated and passes over into the distillate. To eliminate this possible source of error, the author suggests using potassium xanthogenat instead of sodium thiosulphate and in the proportion of 1 gm. for each 0.4 gm. of mercuric oxid.

Determination of nitric and nitrous nitrogen, SALLE (*Ann. Chim. Analyt., 15 (1910), No. 3, pp. 103–105*).—Take 0.5 gm. of the nitrates in a 600–700 cc. flask and add 200 cc. of distilled water, 5 gm. of powdered zinc, from 1 to 2 gm. of ferrous sulphate, and 50 cc. of a 36° Beaumé soda solution. In the neck of the flask place some glass wool and connect with the distilling apparatus. The ammonia is distilled off and collected as usual in decinormal sulphuric acid and titrated.

Detection of nitrates in the presence of oxidizing substances, M. E. POZZI-ESCOT (*Ann. Chim. Analyt., 14 (1910), No. 11, pp. 413, 414, fig. 1; abs. in Ztschr. Angew. Chem., 23 (1910), No. 9, p. 418*).—Oxidizing substances such as chlorates and bromates, and halogen salts such as iodids and bromids, influence the reaction for detecting nitrates. This disturbing influence can be eliminated by reducing the nitrate to an ammonium salt and testing for the ammonia with Nessler's reagent.

Analysis of Chili saltpeter, J. F. VIRGILI (*Rev. R. Acad. Cien. Madrid, 8 (1909), No. 6, pp. 329–337*).—A study of methods, with particular reference to the presence of chlorid and perchlorid of soda and potassium chlorate.

Methods of analyses of the potash salts, H. ROEMER (*Chem. Engin., 11 (1910), No. 3, pp. 80–84*).—A description is given of methods for the analysis of potash salts for potash (platinic chlorid and perchloric acid methods), calcium, magnesium, sodium, sulphur, chlorin, and moisture, together with the methods of preparing the various reagents and the filters and the recovery of the platinum from the wastes.

Recovery of waste platinum, A. W. BLAIR (*Jour. Indus. and Engin. Chem., 2 (1910), No. 3, pp. 102, 103*).—The method in use at the Florida Experiment Station consists in exposing the alcoholic platinum chlorid wash, containing no ammonium chlorid, to direct sunlight until the supernatant liquid is prefectly clear and the platinum is deposited as a black substance. The supernatant alcoholic liquid may either be recovered by distillation or poured off. The potassium platinic chlorid from the Gooch crucibles can be treated in a similar manner. The black platinum residues are treated in the usual way.

Determination of small amounts of calcium in the presence of large amounts of magnesium, A. CAPPEL (*Kali, 4 (1910), pp. 77, 78; abs. in Chem. Ztg., 34 (1910), No. 26, Repert., p. 105*).—The solution, containing a known amount of the sample, is acidified with hydrochloric acid, diluted, 50 cc. of a saturated solution of ammonium chlorid added, and brought to the boiling point. A saturated solution of sodium bicarbonate is added, the solution boiled

again, allowed to settle, and decanted. The calcium carbonate precipitate is then transferred to the filter, where it is washed free from chlorin. The calcium is weighed as calcium oxid.

Determination of sulphuric acid by the barium chromate method, M. HOLLIGER (*Ztschr. Analyt. Chem., 49 (1910), No. 2, pp. 84–93*).—The neutral solution containing the sulphate is brought to boiling (carbonates, if originally present, are destroyed by heating with acid), the acid barium chromate solution (prepared according to Bruhn's method) is added, the solution is boiled again for a minute or so, 1 or 2 drops of ferric chlorid solution is added, then ammonia until the solution has a definite odor, and finally the excess of ammonia boiled off. The precipitate is allowed to stand and settle, the solution filtered into a 800 cc. ground glass stoppered bottle, and the precipitate washed with a little hot water. The filtrate is cooled quickly by immersing the bottle in running water, and 20 cc. of concentrated hydrochloric acid and 20 cc. of a 10 per cent potassium iodid solution are added. The solution is diluted to 400 cc. and allowed to stand (stoppered) for ½ hour, when it is titrated with decinormal thiosulphate solution, using starch as an indicator. One cc. of decinormal thiosulphate equals 3.269 mg. of H_2SO_4.

Method for determining carbon dioxid with the Berthelot bomb, E. GRAFE (*Biochem. Ztschr., 24 (1910), No. 3–5, pp. 277–281*).—The author proposes estimating carbon dioxid in physiological chemical analysis by connecting a valve to the bomb of a Berthelot calorimeter, which in turn leads to a U-tube filled with calcium chlorid (previously saturated with carbon dioxid and then thoroughly aerated), to 2 Geissler or Wetzel tubes containing 40 per cent potassium hydrate and with a superimposed calcium chlorid tube on them, and finally, to an additional U-tube which contains calcium chlorid and soda lime to prevent any reverse external carbon dioxid from entering the apparatus. The valve on the bomb is so regulated that the gases can pass over into the saturating apparatus in small bubbles. The author also suggests utilizing this method for determining the vapor tension at the same time.

Behavior of protein solutions with acetone, T. WEYL (*Ber. Deut. Chem. Gesell., 43 (1910), No. 3, pp. 508–511*).—It is shown that with acetone a complete precipitation of the total protein of cow's milk and blood can be obtained. The method is shown to be very satisfactory as compared with that of Hoppe-Seyler.

Determination of saltpeter in meats with nitron, C. PAAL and A. GANGHOFER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 6, pp. 322–328*).—Continuing previous work (E. S. R., 21, p. 702), the authors propose digesting the meat extract with sodium hydrate solution in place of the preliminary treatment with lead acetate, as recommended by Paal and Mehrtens (E. S. R., 18, p. 525).

An application of the Folin method to the determination of the ammoniacal nitrogen in meat, M. E. PENNINGTON and A. D. GREENLEE (*Jour. Amer. Chem. Soc., 32 (1910), No. 4, pp. 561–568, fig. 1*).—The authors show that unsatisfactory results are obtained in chicken meat by distilling off the ammoniacal nitrogen by the usual method with the aid of magnesium oxid, and they attempt to remove the ammonia directly from the tissue or tissue extract by means of a modified Folin method.

To evolve the ammonia, experiments were conducted with magnesium oxid and sodium carbonate. With both reagents the same results were obtained. The ammonia obtained from the extract was always somewhat less than that obtained from the tissue itself.

Analyses of chicken meat showed that perfectly fresh birds contained from 0.011 to 0.012 per cent of ammonia in the tissues. Those which were kept at

moderately low temperatures 4 to 9 days had from 0.014 to 0.019 per cent, while those stored for over a year were even higher.

The determination of the acid value of crude fat and its application in the detection of aged foods, M. E. PENNINGTON and J. S. HEPBURN (*Jour. Amer. Chem. Soc., 32 (1910), No. 4, pp. 568–572*).—The authors recommend determining the acidity of the crude fat (rendered in the laboratory) as an index for ascertaining the age of chicken meat. It is stated that the acidity of the visceral fat increases more markedly with the time of keeping or with bad handling than does the subcutaneous fat. Rendering the fat in the laboratory takes a much shorter time than the modified official extraction method, and the results are practically as accurate.

Analyses of dark colored vegetable fat residues, C. STIEPEL (*Seifensieder Ztg., 36 (1909), p. 1199; abs. in Ztschr. Angew. Chem., 23 (1910), No. 9, pp. 427, 428*).—The author explains that the difficulty experienced in the analysis of vegetable fats for the saponification number, free fatty acids, and neutral fats is due to the fact that the ether-soluble nonfatty substances have a tendency at higher temperatures to bind large amounts of free alkali which finally enter into the calculation as fat. The author proposes a method which eliminates this tendency to error.

The determination of total sulphur in organic matter, H. SCHREIBER (*U. S. Dept. Agr., Bur. Chem. Circ. 56, pp. 9*).—Probably only two of the many methods proposed, namely, the Barlow-Tollens, or absolute method, and the Osborne, or peroxid method, are deemed either easy to manipulate or accurate. The latter leaves much to be desired when used for solid material. A new method is described, as follows:

Weigh 1 gm. of material in a 100 cc. nickel crucible, add 10 cc. of a solution made by dissolving 100 gm. of sodium nitrate and 150 gm. of sodium hydrate in 500 cc. of water, then 5 gm. of crystallized magnesium nitrate, and stir with a platinum rod, thoroughly mix and see that the sample is broken up as much as possible. Wash down the material adhering to the stirring rod and sides of the crucible with the smallest possible amount of water. (The addition of much water will prolong the subsequent heating unnecessarily.) Heat for one hour on a hot plate covered with a thin sheet of asbestos paper at about a temperature of 130° C. Cover the crucible, so tilting it as to leave an opening for the steam to escape and heat further for one hour at from 150 to 160°, or until the material is entirely dry. If the fusions begin to bump, lower the heat so that the covers will not be jarred down tight on the crucibles and the material lost by frothing. When the mass is entirely dry, put the covers on tight and heat gradually to 180°, then for 35 minutes at about 180 to 200°.

Set the crucible (with the cover on tight) into a round hole in a piece of asbestos board, so that about 1.5 in. of the lower part of the crucible shall project below the asbestos board, which is to be laid flat. Heat with the Bunsen burner ½ hour, allowing the flame to just touch the bottom of the crucible during the first 15 minutes, and then with the full heat during the last 15 minutes. (Never let the inner cone of the Bunsen burner strike the crucible.) During the first 5 minutes of heating with the full flame keep the crucible in an upright position, then remove the cover and so tilt the crucible as to fuse any material which may have crept up the sides. Return the crucible to the upright position, cover, and heat for 5 minutes more. When solidified, and before it has entirely cooled, place the crucible in a 600 cc. beaker with 150 cc. of distilled water and cover. Put the crucible cover also in the beaker, slightly rotate and so tilt the beaker that all parts of the crucible shall touch the water. Run in 13 cc. of hydrochloric acid (specific gravity 1.19) from a burette and again rotate the breaker slightly. Tip the crucible so that the other side comes

in contact with the acid, allow to stand a few minutes, and remove the crucible and cover, washing the adhering liquid back into the beaker with distilled water. Place the beaker on the steam bath and heat ½ hour and then let it stand in the cold over night. Filter and wash the insoluble residue. Heat the filtrate on the steam bath or otherwise, and precipitate with a 10 per cent barium chlorid solution.

The Hoffmann apparatus for estimating moisture in cereals, P. LAVENIR (*Bol. Min. Agr. [Buenos Aires], 11 (1909), No. 1-3, pp. 5-9, fig. 1*).—From the results of comparative tests which were made between the Hoffmann apparatus and the methods usually employed for rye, wheat, corn, and barley, it is concluded that the Hoffmann method furnishes good results.

Relation between the specific gravity and starch content of barley (*Pure Products, 6 (1910), No. 4, pp. 218, 219*).—A table is appended showing this relation. It is shown that in some instances it is unreliable.

Microscopic examination of chocolate and cocoa powders, E. COLLIN (*Jour. Pharm. et Chim., 7. ser., 1 (1910), No. 7, pp. 329-334, figs. 3*).—A description of methods with particular reference to detecting the almond germ in chocolate and cocoa powders.

Determination of xanthin bases in cocoa and chocolate, A. PROCHNOW (*Arch. Pharm., 247 (1909), No. 9, pp. 698-711; abs. in Chem. Ztg., 34 (1910), No. 30, Repert., p. 122*).—This article has been abstracted from another source (E. S. R., 22, p. 413).

Analysis of tea and tea infusions, R. R. TATLOCK and R. T. THOMSON (*Analyst, 35 (1910), No. 408, pp. 103-111*).—A description of the methods of tea analysis as found best fitted for the purpose by the authors, with results of analyses of 22 samples of India, China, and Ceylon teas and their infusions.

Examination of brandies, K. MICKO (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 6, pp. 305-322*).—Cuban, Demerara, and Jamaica rums, arrak, prune brandy, cognac, and storage brandy were examined in reference to specific gravity, alcohol, extract, ash, total acidity, free acid in the distillate, esters, and aroma.

It is shown that each of the above brandies has a characteristic aroma and that this does not emanate from the esters. By utilizing the method proposed by the author, it is possible to detect liquors made from esters and esterlike substances and alcohol.

Qualitative test for fusel oil in brandy, H. HOLLANDER (*Munchen. Med. Wchnschr., 57 (1910), No. 2, pp. 82, 83; abs. in Biochem. Zentbl., 9 (1910), No. 17, p. 783*).—To 25 cc. of the brandy in a distilling flask add 1 cc. of normal alkali solution and distill practically to dryness. Add 5 cc. of acetic acid to 5 cc. of the distillate, heat the mixture to the boiling point, and boil for 1 minute, add a few drops of phenyl hydrazin, bring again to the boiling point, and cool to room temperature. If fusel oil is present, on adding a layer of concentrated hydrochloric acid a green ring will be formed between the two strata.

Detection of saccharose in wine and weissbier, S. ROTHENFUSSER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 5, pp. 261-268*).—The author proposes employing his method, previously noted (E. S. R., 22, p. 10), with certain modifications for detecting small quantities of saccharose, in the presence of invert and other sugars, in wine, weissbier, milk sugar, and fruits.

Illicit desulphiting of wines with urotropin, F. DIACON (*Ann. Falsif., 3 (1910), No. 17, pp. 100-106*).—This gives a series of tests and a discussion with reference to the fixation of sulphurous acid by urotropin in dry and other wines. The estimation of the ammonia in the wine and the various tests for detecting the desulphiting is especially considered.

Detecting and estimating hexamethylenetetramin in wine, BONIS (*Ann. Falsif., 3 (1910), No. 17, pp. 106–112, figs. 2*).—The author draws attention to the fact that ethyl aldehyde under certain conditions will also give a reaction with rosanalin and sulphuric acid. For determining urotropin quantitatively he proposes, in lieu of a better method, to determine the ammonia in the wine by distillation with magnesium oxid and calculating the results back to urotropin.

The sugaring of musts and new wines according to the new wine law, P. KULISCH (*Abs. in Chem. Ztg., 34 (1910), No. 10, Repert., p. 43*).—This article consists of a compilation of wine laws for Alsace-Lorraine, and points out to the practical wine maker certain facts as to this law.

A modified Röse-Gottlieb method for milk and dairy products, EICHLOFF and GRIMMER (*Milchw. Zentbl., 6 (1910), No. 3, pp. 114–121, figs. 3*).—The results of this work indicate that the Röse-Gottlieb method is not absolutely accurate and that it is necessary to operate according to the directions specified by Hesse.

The modified method dispenses with the graduated cylinder, the whole of the ethereal extract being used for the fat estimation. The ether is also removed by a siphon and a specially devised flask which can be weighed is necessary. Shaking the sample with two separate portions of ether-petroleum-ether was found to be superfluous and rinsing twice with 25 cc. of ether after siphoning was sufficient. Attempts to displace ethyl alcohol by the cheaper methyl alcohol were not successful. In evaporating off the ethereal layer, the authors noticed that an accumulation of moisture on the sides of the flask took place. In order to eliminate this disturbing factor a wide-mouthed Erlenmeyer flask is used.

[Determination of catalase in milk], C. REVIS (*Jour. Roy. Inst. Pub. Health, 18 (1910), No. 4, pp. 231–237*).—The author concludes from his investigations with numerous samples of milk from known sources that the triple origin of catalase, that is, from the leucocytes, bacteria, and the milk itself, is probably correct. In the case of the milk catalase, it is pointed out that this may originate from the solution of the leucocytes in the udder, so that an extracellular catalase may in reality be intracellular. The mere determination of the catalytic activity of milk is liable to lead to unwarranted conclusions.

In regard to the water content of butter, F. BENGEN (*Chem. Ztg., 34 (1910), No. 19, p. 149*).—A polemical article in reply to Siegfeld (see p. 210).

Determination of water in butter, M. SIEGFELD (*Chem. Ztg., 34 (1910), No. 38, pp. 330, 331*).—A controversial article in reply to Bengen (see above).

The significance of the stalagmometer, J. TRAUBE (*Biochem. Ztschr., 24 (1910), No. 3–5, pp. 341–345*).—A description of some of the uses to which this apparatus can be put. See also a previous note (E. S. R., 22, p. 413).

The quantitative formol titration method for amino and hippuric acids and polypeptids in urine, V. HENRIQUES and S. P. L. SÖRENSEN (*Ztschr. Physiol. Chem., 64 (1910), No. 2, pp. 120–143*).—A study of methods, with a description of them.

An adiabatic calorimeter for use with the calorimetric bomb, F. G. BENEDICT and H. L. HIGGINS (*Jour. Amer. Chem. Soc., 32 (1910), No. 4, pp. 461–467, fig. 1*).—A description of the apparatus is given, together with a specimen combustion sheet obtained with its use.

Experiments on the preparation of sugared, dried pineapples, H. C. GORE (*U. S. Dept. Agr., Bur. Chem. Circ. 57, pp. 8, fig. 1*).—The principal fact developed in this work is that sliced pineapples when dried and sugared yield a very palatable product of fine keeping quality.

"Since sliced pineapples when allowed to stand in contact with sugar form a large quantity of sirup, it is advisable to dry them until from 65 to 75 per cent of the weight has been lost, and then allow the partly dried slices to stand in contact with about 12 per cent of their weight of sugar for from six to eighteen hours. During this period some sirup may be expected to separate. The slices are then to be redried until they appear fairly firm but are still slightly sticky.

"The sugared, dried pineapples darken slightly on keeping, the Red Spanish variety darkening considerably more than the Smooth Cayenne. In the case of the Red Spanish, this darkening was prevented to a very large extent by keeping in cold storage."

Olive oil, M. RINGELMANN (*Jour. Agr. Prat., n. ser., 18 (1909), Nos. 36, pp. 336–341, figs. 3; 38, pp. 403–407, figs. 3; 40, pp. 469–472, figs. 4; 42, pp. 535–537, figs. 4; 44, pp. 593, 594, fig. 1*).—A description of the machinery and methods for the extraction of oil from the olive.

The utilization of certain fruit pomaces, E. WALTER (*Pure Products, 6 (1910), No. 4, pp. 173–176*).—As the greater part of the fruit aroma exists in the pomace, the author proposes certain methods (distillation and extraction) for obtaining the aroma of raspberries, currants, cherries, strawberries, peaches, and apricots.

[Honey mead or hydromel] (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 184, 185*).—Methods are given for preparing mead from honey and from honey and raisins.

A century of sugar manufacture from the grape, J. DUJARDIN (*Bul. Assoc. Chim. Sucr. et Distill., 27 (1910), No. 9, pp. 833–839*).—A historical discussion of the manufacture of sugar from the grape.

METEOROLOGY—WATER.

Descriptive meteorology, W. L. MOORE (*New York and London, 1910, pp. XVIII+344, figs. 81, charts 45*).—The author states that his object in writing this book was "to provide, so far as possible, the young men entering the service of the U. S. Weather Bureau with a comprehensive introduction to modern meteorology. But to meet their needs in this particular is to provide equally well for all others who are beginning seriously this important science." It is stated that "special effort has been made to have the theory of meteorology lead up to the art of weather forecasting."

Among the new features introduced in this work to which special attention is called are: "(*a*) A graphical representation, based on the latest information, of the relative proportions, at various elevations, of all the important gases of the atmosphere. (*b*) A discussion of the importance of dust particles in the air to the widely different phenomena of sky light, by which we get indirect illumination, and the condensation that precedes and leads to precipitation. (*c*) A discussion, with the aid of an elaborate series of diagrams based on extensive cloud observations, of the movements of the air at various elevations in cyclones and anticyclones. (*d*) A discussion, illustrated with diagrams, of the vertical distribution of temperature during different seasons and different weather conditions. (*e*) An account, both descriptive and explanatory, of the isothermal layer, which, as sounding balloons have shown, is always and everywhere present. (*f*) A chapter on weather forecasting, illustrated by over thirty typical charts of the weather. A study of this chapter should enable the layman, with the aid of a daily weather map, to make a good forecast of the coming weather for two or three days ahead."

The scope and arrangement of the book is indicated by the following list of chapter titles: The atmospheres of the earth and of the planets; atmospheric air; micro-organisms and dust motes of the air; physical conditions of the sun and its relation to the earth's atmosphere; heat, light, and temperature; thermometry; distribution of isolation and the resulting temperatures of the atmosphere, the land, and the water; the isothermal layer; atmospheric pressure and circulation; the winds of the globe; the clouds; precipitation; forecasting the weather and storms; optical phenomena in meterorology; and climate.

A selected list of general works on meteorology as well as special bibliographies of the subjects treated in each chapter are given.

Studies on the general circulation of the earth's atmosphere, F. H. Bigelow (*Amer. Jour. Sci., 4. ser., 29 (1910), No. 172, pp. 277–292, figs. 6*).—This is a discussion of the departures and the residuals of the temperature and precipitation in climatology.

The influence of forests on climate, floods and erosion, G. F. Swain (*Engin. News, 63 (1910), No. 15, pp. 427–429*).—In this article the author takes issue with the conclusions of the Chief of the Weather Bureau of this Department previously noted (E. S. R., 22, p. 516).

Checking floods in the French Alps, B. Moore (*Amer. Forestry, 16 (1910), No. 4, pp. 199–207, figs. 8*).—A short historical account of the damage caused by floods in the French Alps and of measures which have been undertaken to prevent future flood damage.

Meteorological observations (*Maine Sta. Bul. 175, pp. 329–331*).—The usual summaries of observations on temperature, precipitation, cloudiness, and wind movement at Orono, Me., and on precipitation at various places in the State during 1909 are given. The mean temperature was 43.88° F., the mean for 41 years being 42.32°. The total precipitation was 46.98 in., the mean for 41 years being 43.7 in. The snowfall was 97.75 in., the average for 41 years being 91.74 in. The number of cloudy days was 154.

Agricultural-meteorological observations on the Poltava Experiment Field, 1886–1900, V. A. Vlasov (*In Itoghi Rabot Poltavskagho Opuitnagho Polya za Dvadtzat Lyet, 1886–1905. Poltava, 1908, vol. 1, pp. 1–42; App., pp. 1–32, figs. 8*).—This is a report on observations on the relation of meteorological conditions (precipitation and temperature) to the growth of cereals under semiarid conditions.

The average annual rainfall of the region in which the Poltava Station is located is 465 mm., varying from 337 to 628 mm. The average distribution of the rainfall by months is as follows: January 17.8, February 20.9, March 29.8, April 29.3, May 39.1, June 79.7, July 58.5, August 52.1, September 35.8, October 45.4, November 24.8, and December 31.9 mm. The mean temperature of the period of growth of the oats and spring wheat experimented with was 17.3° C., varying from 16.1 to 19.3° C. The spring period, more particularly the period from the sowing of summer cereals to the time of heading, appeared to be the critical stage for these plants, the growth of the crop being dependent to a large extent upon the precipitation occurring during this period, although influenced to a considerable extent by the amount of moisture stored in the soil during the previous fall and winter. No direct dependence of yields on the sums of temperature or on the mean temperature of the period was observed. There was, however, a direct relation between the yield and the ratio of the temperature to the precipitation. The yield of oats was found to be directly dependent upon the precipitation from August of the preceding year to the time of heading, on the mean temperature of the air and the intensity and duration of solar radiation in the period from flowering to ripening, and on the amount

of evaporation during the latter period, and inversely proportional to the amount of precipitation and the relative humidity of the air after the heading stage had been reached.

Briefly stated, a good season for summer cereals is distinguished by a relatively large amount of precipitation and a rather low temperature from the time of germination to heading and a relatively large amount of heat and light with smaller precipitation after the period of heading. The weight of the grain appeared to be directly dependent upon the intensity of solar radiation and inversely proportional to precipitation, humidity of the air, and cloudiness in the period from flowering to ripening. In the case of barley, the yields were directly dependent upon precipitation during the entire period of growth, especially prior to heading and during the preceding fall and spring. A high temperature during the period of growth lowered both the quantity and quality of the yield. In the case of winter cereals the critical period appeared to be during September and October, and sometimes during August. The quantity and quality of winter cereals depended mainly on the precipitation during the period from seeding to the beginning of winter.

The rainfall of Nevis and Antigua, A. H. KIRBY (*West Indian Bul., 10 (1910), No. 3, pp. 273–284*).—This is a study of rainfall statistics of these two islands undertaken in view of a suggestion that the rainfall, particularly of Nevis, is diminishing. The study furnished no evidence that the rainfall of the islands is greatly diminishing, but it is shown that the precipitation has been below normal during the last few years.

The general conclusions reached are "that there are periods of years of diminished rainfall, over large areas, that are intermittent in their occurrence. There is no evidence to show whether these happen regularly or not.

"For both islands, during a period of years in which the rainfall is deficient, the times at which the precipitation may be relied upon to be nearest to the normal amount occur at or near the equinoxes and at the end of the year.

"On the contrary, during such a period, the months whose rainfall suffers the greatest diminution are those which are most remote from the equinoxes, with the exception of those that immediately precede the close of the year. This, in effect, means that a period of diminished rainfall owes its existence mainly to abnormally small precipitation during the beginning and middle of the year. This does not preclude the possibility of assistance being given, in attaining the general result, by the fact that the rainfall of the other months has remained near the average for several years.

"All the above considerations help to indicate that the conditions which regulate changes in the rainfall for periods of several years have a wide area of operation."

Investigations on the nitrogen content of atmospheric precipitation in Flahult, Sweden, H. VON FEILITZEN and I. LUGNER (*Fühling's Landw. Ztg., 59 (1910), No. 7, pp. 248–252*).—Observations are reported which show that the total amount of nitrogen brought down to the soil in precipitation (rain and snow) at Flahult during the year 1909 was 5.18 kg. per hectare (4.61 lbs. per acre). This agrees closely with data obtained at Rothamsted and other places and shows that the amount of nitrogen available for plant growth from this source is very small.

Nitric acid and ammonia in the rainfall at Tonkin, AUFRAY (*Bul. Écon. Indo-Chine, n. ser., 12 (1909), No. 81, pp. 595–616*).—Data from observations covering the years 1902 to 1909 are reported, showing that during this period the nitric acid in the rain water varied from 15.48 to 70.37 kg. per hectare (13.78 to 62.63 lbs. per acre) annually. The ammonia varied from 5.4 to 18.5 kg. per hectare (4.8 to 16.5 lbs. per acre) annually.

These figures show that while the amount of nitrogen contained in the rain water of this region is not very great, it is much larger than that reported from other regions (see above) and is not entirely negligible as a source of plant food in certain years. As was to be expected, by far the larger proportion of the nitrogen is found in the rain water during the warmer months of the year. The conditions influencing the accumulation of nitric acid and ammonia in the rain water are discussed.

Chemistry, and the conservation of our water resources, M. T. BOGERT (*Jour. Franklin Inst., 169 (1910), No. 5, pp. 385–388*).—"The author points out the important bearing that the purity of our water supply has upon its utilization for drinking purposes or in various industries, and the services of the chemist in determining its availability for these purposes. Attention is also called to the serious problem arising in connection with the steadily increasing pollution of our streams and tide-waters by sewage, factory waste, and refuse of all kinds, and how chemistry can be of service in the solution of this problem."

SOILS—FERTILIZERS.

The fixation of nitrogen in some Colorado soils, W. P. HEADDEN (*Colorado Sta. Bul. 155, pp. 48, figs. 8*).—This bulletin records the results of a study of causes of unproductiveness in certain spots on irrigated lands. The barrenness of these spots is popularly attributed to black alkali, but the investigations reported in this bulletin show that it is due to excessive quantities of nitrates.

"These nitrates do not come from the soil nor from the shale as frequently assumed but are formed in the soil.

"The death of many apple trees, some poplars and other shade trees during the season of 1909 was caused by excessive amounts of nitrates in the soil. These nitrates were carried down within the feeding area of the roots by the spring rains and irrigation. The amount of these nitrates accumulated in some of these soils is already very large, amounting to many tons per acre-foot of soil, 100 tons per acre-foot having been indicated by some samples.

"The agency by which the nitrogen of the air is converted into these nitrates in the soil is a group of micro-organisms possessing the power of converting the nitrogen of the air into nitric acid. These organisms have a very wide distribution in our soils and are not always hurtful, but when the conditions of the soil, including moisture, temperature, and the presence of much alkaline earth carbonate, become very favorable they develop so vigorously that they produce the effects recorded in this bulletin. These organisms thrive in some of our best cultivated lands, and some of the anomalies of our agriculture are probably due to them.

"The very considerable amounts of nitrates found in some of our soils, together with the large areas so enriched, and their wide distribution, suggest the probability that the formation of the nitrates of Chile and Peru may have been due to the agency of these organisms."

A thorough bacteriological study of the subject is in progress.

Experiments on the influence of sterilization of the soil on the growth of plants and on the soil, K. K. GEDROITZ (*Trudui Selsk. Khoz. Khim. Lab. St. Peterb., 6 (1909), pp. 304–342; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 6, pp. 846, 847*).—Some of the changes in the soil which are caused by sterilization, such as the increase of the solubility and [illegible] substances and the increase of the absorption ca- [illegible]edly useful for the plant. Other changes due to [illegible]ay prove [illegible]favorable for the growth of

plants; thus the products of the decomposition of the humus, which on some soils are of acid character, may in some cases be injurious to the plants.

The fertilizing influence of sunlight, F. Fletcher (*Nature* [*London*], *83* (*1910*), *No. 2110, pp. 156, 157*).—The author gives some results of investigations on "rab" on rice lands which he conducted in India a few years ago, and questions whether the benefit resulting from this practice is explained, as has been suggested, by the work of Russell and Hutchinson on partial sterilization of the soil. He suggests that the beneficial effects may be due to the destruction of toxic compounds which he claims to have shown to exist in soils (E. S. R., 20, p. 521). He has shown that culture solutions which have been rendered infertile by the growth of plants may be made productive by treatment with volatile antiseptics such as toluene, benzene, chloroform, and carbon bisulphid, which he claims render the toxic substances in the solution insoluble.

Humidity of the soil in connection with the methods of its cultivation under winter and summer cereals, K. G. Mankovski (*In Itoghī Rabot Poltavskagho Opuitnagho Polya za Dvadtzat Lyct, 1886–1905. Poltava, 1908, vol. 1, pp. 43–209; App., pp. 33–111, figs. 13*).—The influence of time, depth, and method of tillage was studied in detail in these experiments.

A series of observations and experiments extending over a number of years showed the advantage of surface tillage in absorbing and conserving the soil moisture, the benefit being especially marked in case of early fall plowing. Early tillage increased the supply of available plant food and so reduced the amount of water necessary to the proper nutrition of the plants. Varying the depth of tillage gave better results than tillage at a constant depth. The marked influence of mulches in increasing the water supply of the soil was also shown.

Storing moisture in the soil, W. W. Burr and W. P. Snyder (*Nebraska Sta. Bul. 114, pp. 5–51, figs. 3, dgms. 14, map 1*).—This bulletin discusses the movement of moisture in soils and the necessity of storing water in the soil during periods of wet weather to be used during periods of drought, describes the type of soil found on the substation farm at North Platte, Nebr., as well as the methods of taking samples for soil moisture determinations, and reports a series of moisture determinations in samples of soil taken to a depth of 15 ft. The results are given in tables and diagrams illustrating the variation in moisture content at different depths under various systems of tillage and cropping. From the data reported the following conclusions are drawn:

"Land which is under thorough cultivation absorbs water much more freely than land not under cultivation or which is covered with grass or for any reason has a hard surface.

"Land under thorough cultivation loses but little water from below the first foot by surface evaporation so long as the mulch is kept in good condition.

"A growing crop uses water from the land in proportion to the growth of dry matter in the crop.

"Land under summer tillage or thorough cultivation from May 1 to September 1 on the substation farm has accumulated from 5.5 to 7 in. more water in the first 6 ft. of soil than similar land growing a crop. The water so stored has been equal to from 40 to 50 per cent of the rainfall for the same period. The moisture content on summer tilled land increases below the 6-ft. area and is apparent to a depth of at least 10 ft.

"Water stored in the subsoil to a depth of at least 6 ft. is available for the use of farm crops, and alfalfa is able to draw water from much deeper areas.

"Abundance of water in the subsoil is a great protection to the crop against drought, and moisture in the surface soil, while it may favor the immediate growth of the plant, does not protect it against prolonged drought. The pro-

tection of the crop against drought is in almost exact proportion to the total available soil water within the reach of the crop.

"Grass crops (alfalfa and brome grass) dry the subsoil to such an extent on the substation farm that the first crop following grass is wholly dependent on the season's rainfall for its moisture supply.

"A rainfall of from a quarter to a half inch may have a decidedly beneficial effect upon a growing crop and is of great assistance in securing a good stand at seeding time. Such a rainfall has little or no effect in increasing the water in the lower soil unless the surface is already moist from previous rains. Less than a half inch of rain falling on a dry soil mulch does not wet the soil below the mulch and is soon evaporated by the sun and wind."

Soil evaporation, R. W. THORNTON (*Agr. Jour. Cape Good Hope, 36 (1910), No. 3, pp. 342–347, figs. 5*).—Experiments at the Robertson Experiment Station with jacketed cylinders similar to those used in investigations on evaporation by this Office are reported. The principal object of these experiments was to determine the effect of cultivation on the conservation of soil moisture. The soil in the cylinders received varying amounts of water and some received surface cultivation when dry enough to permit it and others were left without cultivation.

The results show that the cultivated cylinders lost far less water than the uncultivated cylinders. "It is clearly shown that a vast amount of moisture can be saved by cultivation, amounting in the cool month of September to over half an inch of rainfall, though there is little doubt that the evaporation during the heat of summer will be very much higher, but even taking half an inch per month gives a total of 6 in. per annum, which is an amount that can not be despised. This experiment shows the great benefit derived from cultivation in dry land farming."

An introduction to the study of the soil solution, F. K. CAMERON (*Jour. Phys. Chem., 14 (1910), No. 4, pp. 320–372, figs. 3*).—This article attempts to give "an outline of our present knowledge of the chemical principles involved, with such discussion of the physical and biological factors as is essential to an orderly presentation of the subject." It is based to a large extent upon investigations which have been reported from time to time in bulletins of the Bureau of Soils of this Department.

The transfer of heat in soils, H. E. PATTEN (*Sci. Amer. Sup., 69 (1910), No. 1789, pp. 253, 254, figs. 4*).—This is a brief account of apparatus and methods used in investigations which are reported in detail in a bulletin of the Bureau of Soils of this Department previously noted (E. S. R., 22, p. 20).

The variable character of the vegetation on basalt soils, H. I. JENSEN (*Proc. Linn. Soc. N. S. Wales, 34 (1909), pt. 4, pp. 713–720*).—The various types of vegetation found on basalt formations are described and an attempt is made to correlate the plant distribution with soil characteristics. A table is given showing the average chemical composition and physical properties of typical soils of various geological formations as compared with the basalt soils on which the observations reported were made.

The author's observations show in general "that the defect of basaltic soils is never want of plant food. The worst faults are high water capacity, which causes the drowning of plants in wet weather; and the low capillary power, which impedes a renewal of soil moisture in droughty seasons."

Pineapple soils, W. P. KELLEY (*Hawaii Sta. Rpt. 1909, pp. 58–63*).—Chemical examinations of certain black lands on which pineapples did not grow well showed the presence of from 2.43 to 9.74 per cent of manganese (Mn_3O_4) and indicated a close relation between the manganese content of the soils and the

general appearance and growth of the pineapples. See also a previous note (E. S. R., 21, p. 139).

Deli soils, J. G. C. VRIENS (*Meded. Deli-Proefstat. Medan, 4 (1910), No. 5, pp. 155-171*).—This is a continuation of the report on analyses of tobacco soils previously noted (E. S. R., 20, p. 818).

Analyses of rocks and minerals from the laboratory of the United States Geological Survey, 1880 to 1908, F. W. CLARKE (*U. S. Geol. Survey Bul. 419, pp. XII+323*).—The results of analyses of the large number of samples of rocks and minerals which have been examined by the U. S. Geological Survey up to January 1, 1909, are brought together in this bulletin "with such bibliographic and petrographic data as seem to be necessary, in order to identify the specimens and to facilitate chemical discussion."

European practice and American theory concerning soil fertility, C. G. HOPKINS (*Illinois Sta. Circ. 142, pp. 31*).—This circular consists of replies to a letter addressed to ministers of agriculture of several European countries regarding causes of increase in crop production as well as correspondence with James J. Hill regarding principles of soil fertility.

The action of commercial fertilizers on marsh soils, P. CORNELIUS (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 20, pp. 318-321; abs. in Zentbl. Agr. Chem., 39 (1910), No. 2, pp. 101, 102*).—Experiments extending over a number of years are reported showing the value of Thomas slag applied as a top-dressing and supplemented with nitrogenous manure as a fertilizer treatment for such soils. The Thomas slag was especially beneficial to red clover and beans. The condition of the soil was also improved by the use of manure or compost.

Plant food in Posen soils, M. GERLACH (*Landw. Centbl. Posen, 1909; abs. in Zentbl. Agr. Chem., 39 (1910), No. 2, pp. 103-105*).—Experiments on sandy soil in several places in this province are reported showing that complete fertilizer gave decided increases in yield in every case. Potash and nitrogen were the single constituents showing the greatest effect. Phosphoric acid produced little effect and the results with lime were variable and inconclusive.

Cooperative experiments with mineral fertilizers in the Ekaterinoslav Government, V. V. VINER ET AL. (*Dokladui i Zhurnalui Sovyeshchaniya Zemskikh Aghronomov i Spetzialistov po Selskokhozyaĭstvennomu Opuitnomu Dyelu, Sozvannagho Ekaterinoslavskoi Ghubernskī Zemskoĭ Upravoĭ 27-30 Apryelya, 1908. Ekaterinoslav, 1908, pp. 288; rev. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 6, pp. 873-875*).—Aside from questions of local interest, this report contains a summary of the results obtained by the Russian experiment stations regarding the fertilizing of chernozem.

Until very recently there was great difference of opinion as to the need of fertilizers on chernozem soils. A correct solution of this question was first given by the Shatilov Experiment Station, which found that there are two essential obstacles to the utilization of fertilizer by chernozem—a limited supply of moisture and the possibility of a premature drying up of the crops before complete maturity. The investigations at the Shatilov Experiment Station prove that different fertilizing materials vary with regard to the use of moisture.

Those plants which suffer from poor mineral nutrition are most wasteful of soil moisture. Abundant nutrition also, in the case of certain kinds of fertilizers, induces luxuriant growth of the vegetative organs and promotes the premature drying up of crops. This is most pronounced in case of nitrogen fertilizers. Potash fertilizers do not affect the plants to any great extent in this respect. Although the transpiration coefficient, when potash was applied, was somewhat lowered, crops which received potash fertilizer and were reacted upon by the latter had a tendency to be retarded in their development and

ripening owing to the fact that the expenditure of water, when potash fertilizers were used, increased during the period of ripening. Phosphatic fertilizers, on the contrary, intensified the development of the cereals mainly in the first half of their growth, but they accelerated the development and early ripening of the grain to such an extent that the absolute and relative expenditure of water in the period of ripening was the least in crops which received phosphatic fertilizer. The experiments showed that in chernozem soils phosphoric acid is always in the minimum; that potash salts if effective at all are so only in the presence of phosphates; and that nitrates, especially in the absence of phosphates, produce slight or even negative results.

Comparative investigations on the fertilizer action of nitrate and nitrite, O. KELLNER (*Landw. Vers. Stat., 72 (1910), No. 3-4, pp. 311-317; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 570, II, p. 340*).—In pot experiments with nitrate and nitrite and mixtures of the two even the smaller amounts of nitrite retarded the early growth of oats but did not reduce the final yield as compared with nitrate. When used at the rate of 166 kg. of nitrogen per hectare (148 lbs. per acre) the nitrite interfered with germination. To avoid any checking of early growth it is considered desirable to have the calcium nitrate used as a fertilizer as free as possible from nitrite.

Some observations on the action of lime nitrogen, A. STUTZER (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 13, pp. 194, 195*).—The results of experiments on upland moor soils and on the use of lime nitrogen as a top-dressing are reported.

There was no indication of the formation of dicyandiamid when lime nitrogen was used on moor soils, and consequently the author thinks there is no danger from this source. On the other hand, the experiments indicated that the cyanamid was very slowly converted into available nitrogen compounds in the moor soil. He observed no injury from late top-dressing with lime nitrogen or from the use of dicyandiamid during the period of plant growth.

Analysis of a sample of calcium cyanamid, AEBY (*Bul. Soc. Chim. Belg., 24 (1910), No. 1, p. 7*).—Examination of a sample of this material, which gave off a disagreeable and penetrating odor, showed the presence of 3.4 per cent of calcium carbid. See also a previous note (E. S. R., 20, p. 1118).

The production of nitrous acid and ammonia during the distillation of water, E. VAN MELCKEBEKE (*Bul. Soc. Chim. Belg., 24 (1910), No. 1, p. 7*).—Experiments undertaken to explain the disagreement of the results obtained by Schoenbein and Carius regarding the production of nitrate of ammonia during the evaporation of water are reported. The results, however, were inconclusive.

Economic geology of the feldspar deposits of the United States, E. S. BASTIN (*U. S. Geol. Survey Bul. 420, pp. 85, pls. 8*).—This bulletin discusses chemical and physical characters, origin and geologic occurrence, minerals of the feldspar deposits, methods of mining, commercial availability of deposits, methods of milling, uses, grades and prices, and production, and describes deposits in different localities in the United States. Reference is made to the work of Cushman of this Department on the use of feldspar as a fertilizer.

Phosphates of the Pacific, P. LEMOINE (*Quinz. Colon., 14 (1910), No. 6, pp. 222, 223*).—Data are given regarding the exploitation of phosphate deposits on various islands in the Pacific Ocean.

Phosphates of the oceanic islands, L. DE LAUNAY (*Nature [Paris], 37 (1909), No. 1865, pp. 190, 191*).—Data are given regarding the exploitation of phosphate deposits on various islands in the Pacific Ocean.

Phosphates of the Pacific, H. COURTET (*Bul. Soc. Nat. Acclim. France, 56 (1909), pp. 279-288*).—A brief summary of the principal facts in the articles noted above.

Influence of $CaCO_3$ and $MgCO_3$ on the soil and plants, P. S. Kossovich and L. Althausen (*Trudui Mendelyevsk. Syezda Obshch. i Prikl. Khim., 1 (1907), pp. 490; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 5, pp. 693–695*).—From the results of pot experiments carried on for several years the following conclusions are drawn:

(1) The liming of acid soils of a decidedly podzol nature, without addition of other nutritive substances, strikingly increased the yield of various plants; on soils of a less pronounced podzol nature the influence of liming was weaker; on a gray forest clay it produced almost no favorable influence; and on chernozem the liming either did not at all increase the yield or raised it very slightly. (2) The increase of yield on the same acid podzol soil was less when the lime (CaO and $CaCO_3$) was applied at the same time that other fertilizers furnishing nitrogen, phosphoric acid, and potash were added. (3) The favorable action of calcium carbonate on acid podzol soils increased with the amounts of this fertilizer up to a certain limit, which was close to the amount of lime requisite for the neutralization of the soil; further additions of lime, according to the kind of plant, either remained without essential influence on the yield or perceptibly lowered it; in some cases a large quantity of lime entirely ruined the plants. The injurious action was shown in delayed sprouting, death of the seedlings, and the browning of the leaves at the borders and their final drying up. However, at the same time that the majority of the plants in a pot were injured or killed, individual plants occasionally developed almost normally. (4) Mustard and clover proved to be more sensitive to the acidity of the soil, especially the former; accordingly the liming strongly increased the yields of these plants. An excess of lime, however, affected them very injuriously. Buckwheat, vetches, peas, and rye were less affected by the acidity of the soil and an excess of lime injured them less. Barley, though not particularly sensitive to the acidity of the soil, was benefited by liming and stood excessive quantities of calcium carbonate quite well. (5) The most probable injurious compounds formed in strongly acid soils upon excessive liming are the normal carbonates of sodium and calcium. The clearly alkaline reaction of the soils which received an excess of lime and also the nature of the development of the plants, seem to support this assumption. (6) In general, calcium oxid, precipitated lime, marble, dolomite, magnesite, and basic magnesium carbonate acted like calcium carbonate. However, the different forms varied in harmfulness when applied in excessive quantities on soils of strongly podzol nature, basic magnesium carbonate acting most intensely in this respect and dolomite least. (7) The time of the introduction of the lime (immediately before sowing or 30 days before sowing) did not modify the influence of excessive liming; the result was similar when the same plants were sown again on the soils which had received lime the preceding year. Vetches and buckwheat, which were used in these experiments, suffered to the same extent each year.

The use of boron as a catalytic fertilizer, H. Agulhon (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 5, pp. 288–291; abs. in Rev. Sci. [Paris], 48 (1910), I, No. 7, p. 220; Ann. Gembloux, 20 (1910), No. 5, pp. 303, 304*).—This article summarizes some of the facts more fully presented in a thesis by the author (see p. 230) on the presence and rôle of boron in plants.

The investigations reported indicate that boron is a useful element of higher plants. The addition of small quantities either to a synthetic culture solution or to a natural soil increased appreciably the weight of dry matter produced. The cultural value of the boron appears to be quite similar to that of manganese. Its use in practical agriculture would seem to be feasible because the small amounts necessary can be supplied at slight cost.

AGRICULTURAL BOTANY.

Landmarks of botanical history, I, E. L. GREENE (*Smithsn. Misc. Collect.. 54, No. 1870, pp. 329*).—This paper discusses certain epochs in the development of the science of botany, the subject being viewed from a philosophical rather than an industrial standpoint. The author gives prominence to the biography of some of the early botanists, including Theophrastus, Brunfelsius, Fuchsius, Tragus, and Cordus of the fifteenth and sixteenth centuries. The present part is devoted to a period prior to 1562 and is to be followed by further contributions on this general subject. The author considers botany as the relation of plant to plant and to the whole vegetable kingdom without reference to its economic or commercial bearing.

The publication is issued in limited edition principally for distribution to public libraries and educational institutions, but a few copies may be obtained at 65 cents per copy by addressing the Smithsonian Institution, Washington, D. C.

Essays in commemoration of the centenary of the birth of Charles Darwin and of the fiftieth anniversary of the publication of the Origin of Species, A. C. SEWARD (In *Darwin and Modern Science. Cambridge, 1909, pp. 66–84, 102–111, 223–246, 298–318, 385–400, 401–423*).—This series of essays was prepared to illustrate the far-reaching influence of Darwin's work, and gives a summary of the present state of information regarding the different topics discussed. The papers of botanical interest are: Variation, by H. de Vries; The Minute Structure of Cells in Relation to Heredity, by E. Strasburger; The Influence of Environment on the Forms of Plants, by G. Klebs; Geographical Distribution of Plants, by W. Thistleton-Dyer; Darwin's Work on the Movements of Plants, by F. Darwin; and The Biology of Flowers, by K. Goebel.

Report of the department of botany, H. HASSELBRING (*Estac. Cent. Agron.* [*Cuba*] *Rpt.* (*English Ed.*), *2* (*1905–1909*), *pt. 1, pp. 68–71*).—An outline is given of the investigations begun at the station, the principal work including plant breeding with tobacco, physiological investigations of various kinds, and plant introductions.

Some new hybrids and their bearing on the classification of wheat, B. C. BUFFUM (*Abs. in Science, n. ser., 31* (*1910*), *No. 799, p. 634*).—Attention is called to various classifications that have been proposed for the species and varieties of wheat. As a result of the author's experiments in hybridizing wheat, it has been found that practically all the species and varieties may be reproduced. His hybrids resulted from crossing a mutating winter wheat with a mutating winter emmer. From these hybrids he has obtained in the second generation well-defined specimens of a number of species, including *Triticum monococcum, T. dicoccum, T. spelta,* and *T. polonicum,* as well as various forms of what would be classified as *T. sativum.*

The author believes that his experiments have shown that all the wheats have been developed from not more than two forms and possibly from a single form of Triticum.

Notes on teratology in tropical plants, M. T. COOK (*Estac. Cent. Agron.* [*Cuba*] *Rpt.* (*English Ed.*), *2* (*1905–1909*), *pt. 2, pp. 140–142, pls. 2*).—Abnormal growth of *Yucca aloifolia*, cultivated roses, strawberries, and pineapples are described.

Change of sex in Humulus lupulus not due to traumatism, W. W. STOCKBERGER (*Abs. in Science, n. ser., 31* (*1910*), *No. 799, p. 632*).—It has been claimed that the bisexual inflorescence of the hop is due to wounds, and the author has conducted some experiments to refute this theory.

The removal of the taproot, severe pruning, removal of portions of the crown, and cutting back of the vines failed to cause any change in the normal production of the flowers. The experiments further showed that plants would transmit the abnormal type of inflorescence when propagated asexually, and that only plants bearing pistillate flowers are subject to a reversal of the sex.

In an experimental plat of 1,400 seedlings all the plants were apparently normal at first, but later in the summer some of the plants bearing pistillate flowers developed staminate ones also. None of these plants had been subjected to any severe treatment and it is held that some factor other than traumatism must produce sex reversal.

Corallorhiza and mycosymbiosis, B. C. Gruenberg (*Abs. in Science, n. ser., 31 (1910), No. 799, p. 633*).—An examination of the rhizomes of several species of Corallorhiza showed that they contained secondary starch, which the author claims must have been derived from organic materials in the soil or humus. In considering the fungus symbiont it is not thought that the Corallorhiza is dependent upon it for its nutrition. While the symbiosis is a constant character of the species examined it is thought to be a result of the habit of the fungus and not to be obligatory for the maintenance of the orchid. It is thought that the fungus may assist the orchid by furnishing conditions favorable to the germination of the seeds, but it is believed that other conditions may also stimulate the seeds to germinate. The infection of the rhizome is said to take place about the time of germination. The digestion of hyphal masses within the cortical cells is considered as a means for preventing the spread of the fungus to the point of injuring the orchid and is not assumed to be necessary for the nutrition of the plant.

Studies upon oxidases, H. Hasselbring and C. L. Alsberg (*Abs. in Science, n. ser., 31 (1910), No. 799, p. 637*).—In investigations of a disease of cabbages and spinach resembling in some respects the mosaic disease of tobacco, the authors found that there appeared to be an increase in the oxidizing power of the plants. Studies of the extract of the plants showed that there was probably not an increase in the oxidase but a decrease in the anti-oxidases. It has been shown that heating plant extracts would cause a loss of the oxidizing power, which would be restored after the solution had stood for several hours. In the authors' investigations it was found that if a heated extract was centrifugated immediately after heating and the clear liquid pipetted off from the coagulum, the clear liquid did not acquire any oxidizing power on standing, while the liquid containing the coagulum did recover it. It is believed that in this case the authors were dealing not with a zymogen but with the inclusion of the enzym in the clot and its subsequent leaching out on standing.

The protection of plant cells against fungus attack, L. P. Brullov (*Zhur. Bolyezni Rast., 1908, No. 1; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 4, pp. 591, 592*).—The results of laboratory investigations on the protection of plants against fungus attack are given.

The studies were made with laboratory material of *Vaucheria sessilis* (?), which the author states is a good subject for study on account of the ease with which it may be examined. It is quite frequently attacked in the laboratory by an undetermined fungus, the hypha of the fungus attaching itself to the cell wall of the host plant. In response to the irritation caused by the fungus the protoplasm of the cell deposits on the inner side of the cell wall a series of layers to protect against the entrance of the fungus. As a result of these deposits the fungus either ceases to grow, or, if it is very active, ultimately penetrates the protecting layer and expands within the cell, destroying its contents. The cellulose deposit, on account of its resistance to staining reagents, is said to be readily observed and seems to be a form of suberin or

cutin. The author claims that through the irritation produced by the fungus there is a response which results in a chemical change in the nature of the product.

Studies on the development of bulbous plants, G. ANDRÉ (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), Nos. 9, pp. 545–547; 11, pp 713–715*).—A report is given on the variation in dry matter, ash, total nitrogen, and the other constituents of bulb-forming plants at different stages of their growth. Most of the experiments were made with onions, of which 100 of equal size and weight were selected for study. Of these 20 were analyzed and the remainder planted April 13. At intervals of a month or 6 weeks 20 of the onions were lifted and analyzed, the last two periods being when the plants were in full flower and when they had matured.

There was found to be a loss in the fresh weight of the bulbs immediately following planting, but this was subsequently changed into an increase in both fresh and dry material, until at the time of flowering a maximum was reached for both the aerial and subterranean parts of the plant. From the flowering period until maturity there was a gradual reduction both in fresh and dry weight of all parts of the plant, showing that there was a continuation of the respiratory function of the plant until its maturity.

In studying the increase in ash, nitrogen, etc., it was found that there was a tranfer of nitrogen, phosphoric acid, and other constituents from the bulb to the aerial plant immediately after the bulbs were set in the soil. This transfer was later followed by increases when the plant growth had become well established in the ash, total nitrogen, phosphoric acid, lime, magnesia, and potash in both the bulbs and aerial parts of the plants.

Winter condition of lenticels, L. A. KENOYER (*Trans. Kans. Acad. Sci., 22 (1909), pp. 323–326*).—The author has investigated the claim that lenticels are usually closed during the winter by the suberization of the last layers of cells and opened again when spring activity is resumed. He conducted a series of experiments with twigs of 35 different species of plants, using the pressure of a mercury column to force air through the twigs.

Of 100 twigs tested, 65 seemed to have some or all of the lenticels open for respiration during the winter months. It was noticed that the 2-year-old growth had generally more open lenticels than the growth of the season and that the 3-year-old growth had more than that of 2 years. It was also observed that in some species some twigs gave positive results while others gave negative when tested.

Examinations were also made for lenticels on the roots of several species and they were found developed on many but not all. Their structure was quite similar to that of lenticels occurring on the stems. Of 12 species of roots examined, 4 were found with open lenticels and 8 without. In several instances the root lenticels were found to be closed while those on the stems of the same plants were open.

Effect of various gases and vapors upon etiolated seedlings of the sweet pea, L. I. KNIGHT, R. C. ROSE, and W. CROCKER (*Abs. in Science, n. ser., 31 (1910), No. 799, pp. 635, 636*).—Various investigators having shown that the impurities of laboratory air have a marked effect on etiolated seedlings of various leguminous plants, the authors have studied the effect of gases and vapors upon sweet pea seedlings. The effects of the gases are shown in decrease of rate of growth, in length, and in swelling and a horizontal placing of the region of growth.

About one dozen different kinds of gas and vapor were tested, and the effect on inhibition of growth, swelling, and horizontal placing is shown. Ethylene gas at the rate of 0.1 part in 1 million of atmosphere was found to cause a

considerable inhibition of growth, while 2.5 parts of illuminating gas in the same amount of air had a similar effect.

In commenting upon this investigation, the authors believe that the use of etiolated epicotyls of sweet peas would furnish a delicate and accurate test for traces of illuminating gas in greenhouses, where often a considerable injury is met by the escaping of gas in quantities too small to detect by chemical methods.

The distribution and formation of respiratory chromogens in plants, V. I. PALLADIN (*Izv. Imp. Akad. Nauk* (*Bul. Acad. Imp. Sci. St.-Pétersb.*), *6. ser., 1908, No. 12, pp. 977–990; abs. in Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *10* (*1909*), *No. 4, pp. 568, 569*).—After describing a method of detecting chromogens the author gives a report of the examination of 71 species of plants, in 67 of which respiratory chromogens were found. They were absent in *Agaricus campestris*, *Helvella esculenta*, wheat seedlings, and asparagus, but as other methods show their presence in all but the asparagus, it is believed that only that plant may be considered an exception to the general rule of their occurrence.

The method for detecting chromogens consisted of boiling the plants in water, after which they were comminuted. To the colorless solution obtained a small quantity of peroxidase prepared from horse-radish was added, together with a few drops of a weak solution of hydrogen peroxid. In the presence of chromogens the liquid becomes red and then reddish brown.

In considering the conditions for the formation of these chromogens the author examined the influence of carbohydrates, and found in experiments with *Rumex patientia* that supplying the plants with a 20 per cent solution of saccharose increased the quantity of respiratory chromogen in the leaves. In the superficial cells of the leaves which had been furnished saccharose an abundant red pigment was observed, and this is held to be due to the fact that the introduction of the sugar increased the respiration and the oxidizing chromogens did not need to be reduced.

This same cause is believed to be the reason for the red and violet coloration of shoots in many plants in the early spring. The occurrence of red pigment in the fall is held to be due to the low temperature, which is accompanied by oxidizing reactions. Under low temperature and the accompanying processes of the dying of the leaves the chromogens are oxidized into pigments.

Influence of phosphates on the respiration of plants, N. N. IVANOV (*Izv. Imp. Akad. Nauk* (*Bul. Acad. Imp. Sci. St.-Pétersb.*), *6. ser., 1910, No. 4, pp. 303–318, fig. 1*).—Experiments were made with yeast, wheat seedlings, and etiolated tips of broad beans which showed that 0.5 per cent of disodium phosphate depressed the fermentation of living yeast for a few hours, a 2 per cent solution depressed the fermentation of living dry wheat germs. A 1 per cent solution increased the evolution of carbon dioxid in dead wheat germs as well as those treated with acetone, and a 0.5 to 2 per cent solution stimulated the evolution of carbon dioxid in dead wheat germs in the presence of a current of hydrogen. The etiolated tips of the broad beans responded in the same manner as wheat germs and yeast. Monopotassium phosphate was found to produce a depressing effect in all cases.

The rôle of boron in plants, H. AGULHON (*Recherches sur la présence et le rôle du bore chez les végétaux. Thesis, Paris, 1910, pp. 163, pls. 6; abs. in Rev. Vit., 33* (*1910*), *No. 847, pp. 272, 273*).—In another publication (see page 226) an account is given of the catalytic action of boron when present in plants. In the present abstract the rôle and action of this element when present in the plant kingdom are discussed.

In experiments made with wheat, oats, peas, radishes, etc., grown in sterile liquid media, in sterilized soil, and in the open field, it was found that the different species reacted differently toward boron, but that for each there was an optimum which favored the growth and yield of the plant. Greater quantities than the optimum were found to reduce the chlorophyll content of the plant and to check its root development.

The influence of lime on soil bacteria, H. FISCHER (*Landw. Vers. Stat., 70 (1909), No. 5-6, pp. 335-342*).—This paper gives the results of experiments with fluid cultures with lime and other substances on the activity of soil bacteria, especially with reference to their effect on the utilization of ammonia and nitrate nitrogen by the bacteria.

It was found that both ammonia and nitrate nitrogen could be utilized in considerable quantities by the soil micro-organisms in the production of albuminoid nitrogen, the ammonia nitrogen aiding this transformation in a greater degree than the nitrate nitrogen. The presence of calcium carbonate aided the formation of albuminoid nitrogen from sulphate of ammonia, but not to any considerable extent. A surplus of barium carbonate appreciably enhanced the albumin formation from sulphate of ammonia, but diminished that from sodium nitrate. Magnesium carbonate lessened the transformation of ammonia nitrogen into albuminoid nitrogen, and iron sesquioxid lessened the transformation of both ammonia and nitrate nitrogen. Quicklime exerted a much greater influence on the soil bacteria than calcium carbonate.

Effects of acidity of culture media on morphology in species of Penicillium, C. THOM (*Abs. in Science, n. ser., 31 (1910), No. 799, p. 635*).—In connection with previous studies (E. S. R., 22, p. 531), the author has found that the inhibiting effects of acid in culture media vary with the species and the kinds of acid. The first effect noted is usually the retardation of growth and finally of the production of the colored spores. In testing their tolerance to acid the close relationship of certain groups and forms is emphasized, and the author believes that this will be found a useful accessory to the description of species.

International catalogue of scientific literature. R—Bacteriology (*Internat. Cat. Sci. Lit., 6 (1909), pp. VIII+1040*).—The present volume is in continuation of the series previously described (E. S. R., 14, p. 1049), the literature indexed being mostly that of 1906. More than 9,000 titles are indexed both by author and subject. The American literature continues to be very inadequately represented, although there is some improvement over the number of titles in the previous volume.

FIELD CROPS.

Dry land farming in eastern Colorado, H. M. COTTRELL (*Colorado Sta. Bul. 145, pp. 4-32, figs. 4*).—This bulletin is a manual of general information for the use of the prospective dry-land farmer in eastern Colorado. The proper system of farming is suggested, the methods of handling dairy cows, poultry, and gardens best adapted to the region are stated, and directions given for retaining moisture in the soil, selecting crops for dry-land farming, and securing the best results from them.

Crop rotation for Illinois soils, C. G. HOPKINS (*Illinois Sta. Circ. 141, pp. 20*).—This is an address delivered before the Illinois State Farmers' Institute on crop rotation and fertilizers as related to permanent agriculture in the United States and European countries. The general subject of soil fertility is reviewed and notes are given on rock phosphate, bone meal, potassium salts, and ground limestone.

On the manuring of pastures in New Zealand, B. C. Aston (*Reprint from Farmers' Union Advocate, pp. 7*).—The particles of basic slag which passed through screens having 100, 60, and 30 wires to the linear inch when applied to plats of pasture land at the rate of 1,225 lbs. per acre produced 17,800, 17,000, and 16,600 lbs. of green grass per acre, respectively, while an unmanured plat produced at the rate of 12,600 lbs.

Experiments were conducted at Cockle Park and Moumahaki to determine the effect of applications of phosphorus upon the power of pastures to support sheep. At the former point an application of 50 lbs. of potash increased the total live weight supported by 27 per cent, while the percentages of increase following an application of 7 cwt. superphosphate, 5 cwt. basic slag, 4 tons of quicklime, and 10 cwt. basic slag were 91, 96, 4, and 233, respectively. At Moumahaki the maximum increase of live weight supported, 32.9 per cent, followed the application of 3 cwt. of superphosphate, while the increased percentages from applications of 5¼ cwt. basic slag, 2½ cwt. basic slag, 2½ cwt. of Malden Island guano, and 24 cwt. of ground lime were 28.6, 27.4, 11.8, and 13.4, respectively. A 5-acre field test showed that the application of 21 shillings worth of basic slag enabled an increase at the rate of 2½ sheep to the acre to be carried during a period of 126 days.

Annual report for 1909, A. D. Hall (*Rothamsted Expt. Sta., Harpenden, Ann. Rpt. 1909, pp. 16*).—A brief history of the station and a statement of its object and plan of work are followed by résumés of each of a number of papers published during the year by members of the laboratory staff.

Meteorological data for 1909 are given and the yields secured on each of the different plats during recent years presented in tabular form. The general plan of the work has already been noted (E. S. R., 7, p. 380).

Experiments in cultivation, H. Dammann (*Rev. Secc. Agron. Univ. Montevideo, 1908, Nos. 3, pp. 23–73; 4, pp. 203–213*).—Analyses of the soil and subsoil of the field experimented on and of numerous varieties of clovers and grasses are followed by the results of trials of these grasses and clovers grown separately and in mixtures. Variety tests of winter and spring barley are also given.

The application of superphosphate appeared to increase the protein content of 5 different varieties to the extent of from 0.3 to 1.22 per cent. The late sugar beet variety Zuckerfabrick Kleinwanzleben produced the maximum yield of 8,025 kg. of sugar per hectare (about 7,142 lbs. per acre) but was excelled in percentage of sugar by Dippes Elitezuchtung. A scheme is given for the classification of soils as poor, medium, normal, rich, and very rich according to their nitrogen, phosphoric acid and lime content. A complete fertilizer including lime appeared to produce much higher yields of American wheat than did any incomplete mixture. The application of phosphoric acid and nitrogen to barley was followed by a greater increase in yield of grain and straw than was the application of the same mixture with potash or of potash and nitrogen or potash and phosphoric acid. In another series of tests the highest yield of barley was obtained from the application of potash, phosphoric acid and nitrogen to land fertilized the previous year with manure, phosphoric acid and nitrogen, while an equal yield of grain but a lower yield of straw was obtained without any fertilizer whatever upon land enriched the previous year with manure. The Eckendorf Original produced a higher yield of roots than any other forage beet but had also the lowest percentage of dry substance and was excelled in yield of dry substance per acre by the variety Heinrich Mettes.

Experiments in the cultivation of forage plants, J. Schroeder and H. Dammann (*Rev. Inst. Agron. Montevideo, 1909, No. 5, pp. 222–238*).—Chemical analyses of corn. buckwheat, sorghum, Johnson grass, spring rape, sainfoin,

vetch, artichokes, and potatoes are given with a brief discussion of the adaptability of each to the region and its cultural requirements.

[Rice and cotton investigations], W. P. KELLEY and F. G. KRAUSS (*Hawaii Sta. Rpt. 1909, pp. 63–76, pls. 4*).—A progress report is given of work with rice and cotton and some data on the cotton work presented.

The rice yield during 1909 was greatly injured by the unprecedented attack of a destructive army worm (*Leucania unipuncta*). Rice No. 19, S. P. I. 12508, is believed to be firmly established and is being planted by growers.

Propagation of cottons by cuttings and budding was undertaken, and also experiments in pruning plants during their second season of growth. Sea Island types were found to respond best to low pruning in which a mere stump, 3 to 6 in. in length, is left. The Caravonica types do best when from one-fourth to three-fourths of the previous season's growth is removed. Too severe pruning causes excessive woody growth in these types at the expense of the fruit. Such rank growth is brittle and liable to splinter in heavy winds. Low pruning of upland cottons insures the survival of a larger percentage of plants until the next season, but when pruning to spurs after the fashion of California grape growers was resorted to the fewer plants which did survive outyielded those which were pruned later.

It has been found possible to obtain 100 or more cuttings from a single Caravonica plant. Shield budding has proved effective and practicable in field culture. Brief notes are given on a number of Sea Island, Egyptian, Upland, and Caravonica varieties which are being tested, on 2 wild native Gossypiums (*G. tomentosum* and *G. drynarioides*), which are being propagated for use as a basis for breeding work, and on Chinese and Japanese matting sedges (*Cyperus teget-formis* and *Juncus effusus*).

Report of an experiment on the manuring of rye grass and clover at several centers in the county during 1906–7, E. PORTER and R. C. GAUT (*County Council Lancaster, Ed. Com., Agr. Dept., Farmer's Bul. 15, pp. 23*).—The results of the uniform manurial plat experiments at 11 different centers in 1906–7 are summarized in the following table:

Results of tests with fertilizers on ryegrass and clover.

Plat No.	Fertilizer.	Cost of fertilizer.	[a]Average profit on first crop.	[b]Average profit on aftermath at 2 centers in 1907.
		£ s. d.	s. d.	s. d.
2	Nitrate of soda, 1 cwt	9 10	6 10	10 3
3	Nitrate of soda, 1 cwt.; superphosphate, 2 cwt	15 1	7 5	9
4	Nitrate of soda, 1 cwt.; superphosphate, 2 cwt.; muriate of potash, 1 cwt	1 4 7	9 11	13 3
5	Superphosphate, 2 cwt.; muriate of potash, 1 cwt	14 9	8 6	9 9
6	Nitrate of soda, 1 cwt.; basic slag, 2 cwt.; muriate of potash, 1 cwt	1 3 2	9 5	16 3
7	Sulphate of ammonia, 88 lbs.; superphosphate, 2 cwt.; muriate of potash, 1 cwt	1 4 2	−1 8	7 0
8	Nitrate of soda, 2 cwt.; superphosphate, 2 cwt	1 4 11	16 8	13 3

[a] Valued at 2s. per cwt. [b] Valued at 3s. per cwt.

On plat 2 the nitrate of soda stimulated the rye grass without injuring the clovers, and the crop was bulkier and taller than that on the check plat. Plat 3 was unsurpassed at 4 of the centers and usually showed more satisfactory results than plat 2. Plat 4 was usually an improvement upon plat 3, and had a full growth of good length in both clovers and rye grass. Plat 5 had, at every center, the best clover growth but the rye grass was usually no stronger than on the check plat. Plat 7 was deficient in the number of clover plants

and these were weak in growth. On plat 8 clover plants were almost entirely absent.

Nitrate of soda produced 1 cwt. 3 qrs. more first-crop hay per acre than sulphate of ammonia, supplying the same amount of nitrogen when both were used alone, and when they were used in conjunction with phosphatic and potash fertilizers, the nitrate of soda produced 3 cwt. more hay. Two cwt. superphosphate produced 2½ qrs. more first-crop hay per acre than did 2 cwt. basic slag. When kainit, sulphate of potash and muriate of potash were applied in amounts supplying equal quantities of potash, kainit produced approximately 2 cwt. less per acre than either of the other fertilizers. One cwt. of muriate of potash produced 4 cwt. 1 qr. per acre more first-crop hay than did ½ cwt. of the same fertilizer and 2 qrs. more than did 2 cwt. of the fertilizer. The complete mixtures produced the best herbage in both the first and second crops. The abundance and strength of clovers was impaired by using sulphate of ammonia early in the year or by forcing the rye grass by heavy applications of nitrate of soda, which was a more expensive source of nitrogen but gave a larger increase in crop than sulphate of ammonia. Phosphatic and potash fertilizers favored the growth of clover without assisting that of the rye grass.

Spring grains, A. M. TEN EYCK (*Kansas Sta. Bul. 166, pp. 357–369, figs. 8*).—In a test of 13 varieties of oats, Improved Red Texas and Sixty Day produced the highest average yields, 44.03 and 43.93 bu. per acre, respectively, during the period 1903–1909 inclusive. For the same period Select Mandscheuri barley yielded 34.7 bu., spring emmer 30.49 bu., and durum wheat 11.74 bu. per acre. In 1907, winter spelt yielded 64.27 bu. per acre. The average yields of all varieties of oats and barley tested during the period were 1,409 lbs. of oats and 1,666 lbs. of barley per acre. The Red Texas oat produced the heaviest grain but was excelled in percentage of meat or kernel by the White Russian and Burt varieties with 78.94 and 75.24 per cent, respectively. Tennessee winter barley yielded 15½ bu. more grain per acre during 5 years than did the best producing variety of spring barley, and durum wheat 50 per cent more than ordinary spring wheat.

Brief descriptions are given of several of the varieties of oats and wheat tested. Five varieties of oats, 8 of winter wheat, 4 of barley, and 1 or more each of spring wheat, emmer, and winter rye have been improved through selection and breeding. The head row of Kharkof wheat producing the highest yield in 1907–8 thrashed out 349 per cent more grain than the lowest producing head row and 46 per cent more than the average of the 50 rows in the test. In a similar test of Red Texas oats, the highest yielding row produced 270 per cent more of grain than the lowest, and 42 per cent more than the average row.

A table presents the yields, tillering power, height, and number of plants harvested from each of the rows of No. 721 Mandscheuri barley. Selected Mandscheuri produced during 1907–1909, inclusive, 4.75 bu. per acre more than the original variety, while selected strains of Bonanza showed an improved yield of 0.62 bu. per acre and two-row Mandscheuri during the first 2 years of the test showed an increased yield of 2.41 bu. per acre. The number of bushels of seed of various farm crops distributed during each year of the period 1904–1909, inclusive, are presented in tabular form.

The tillering of cereals, J. C. SCHOUTE (*Verhandel. K. Akad. Wetensch. Amsterdam, 2, Sec., 15 (1910), No. 2, pp. XIX+492, figs. 15*).—This volume summarizes and discusses the work of numerous investigators on this subject.

Report of alfalfa investigations, P. K. BLINN (*Colorado Sta. Bul. 154, pp. 3–10, figs. 6*).—This is a progress report of an attempt to improve the hay and seed-yielding traits of alfalfa by systematic seed selection.

Plants having a light green colored foliage appeared to suffer the most from frost. Among the different varieties the Turkestan was better than any other in tendency to root down from the crown branches and was eaten by horses in preference to ordinary kinds. The heaviest seed-yielding varieties of 1 year proved best in the following year as well, but it is pointed out that although seed-yielding tendency may be affected by hereditary traits, it is doubtless more generally influenced by climatic and cultural conditions.

Experiments in the production of brewing barleys, H. DAMMANN (*Rev. Inst. Agron. Montevideo, 1909, No. 5, pp. 201–211*).—Plat experiments testing a mixture of potash, lime, nitrogen and phosphoric acid and the same mixture save for the omission of each of these plant foods in turn showed the highest yield when all were applied but a lower protein content than in any case save when nitrogen was omitted, when the protein content was only 7.75 per cent. The lowest yield of grain and highest protein content followed the omission of phosphoric acid from the mixture.

In field tests of the same plant foods and of manure, the highest yield of grain was obtained after an application of potash, phosphoric acid, and nitrogen to land fertilized the preceding year with nitrogen, phosphoric acid and manure, while practically the same yield was obtained on a plat unfertilized but fertilized the preceding year with manure. All other plats gave lower yields. On each plat, the 1908 crop had been potatoes and the 1907 crop wheat.

In a variety test Svalof Hannchen produced the highest yield of grain. Svalof Prinzessin had the highest protein content, although the lowest yield of grain.

Experiments on the cultivation of forage and sugar beets, H. DAMMANN (*Rev. Inst. Agron. Montevideo, 1909, No. 5, pp. 213–221*).—Meteorological data for the period of the experiment are presented. The last of August was found to be the best date for planting and plantings of one plant to each 800 to 900 sq. cm. (from 124 to 139.5 sq. in.) produced the highest yield of sugar per acre.

Fertilizer experiments with sugar beets, J. GRAFTIAU (*Ann. Gembloux, 20 (1910), No. 2, pp. 65–71*).—An analysis of the soil on which the experiments were conducted is given. Each plat was fertilized with superphosphate and sulphate of potash at the rates of 600 and 200 kg. per hectare (534 and 178 lbs. per acre) respectively. Nitrate of soda (calcium cyanamid), and sulphate of ammonia with and without lime, were tested as sources of nitrogen. The plat fertilized with calcium cyanamid produced less than three-fourths as much sugar as did each of the others, and the proportion of leaves and crowns to roots was much greater.

Fertilizer experiments with sugar beets, E. SAILLARD (*Jour. Agr. Prat., n. ser., 19 (1910), No. 9, pp. 267–269*).—Nitrate of soda, calcium cyanamid, and lime nitrate applied with potassium and manure produced 5,513, 5,527, and 5,785 kg. of sugar per hectare respectively, while on plats fertilized with (1) potassium chlorid, (2) kainit and potassium chlorid, and (3) without potassium but with nitrate of soda and manure the yields of sugar were 4,848, 5,221, and 4,651 kg. per hectare, respectively.

Tests of the cultural value of varieties of corn, H. DAMMANN and J. SCHROEDER (*Rev. Secc. Agron. Univ. Montevideo, 1908, No. 4, pp. 185–202, pls. 4*).—Reports are given of tests of 18 North and South American varieties of corn and of 12 North American varieties separately reported. The dates of planting, sprouting, flowering, and harvesting are reported for each variety as well as the average height of the plant, weight per hundred grains and per hectoliter, the yield per plat and per hectare, and the chemical analysis of each variety. The highest yields were obtained from Hickory King and Iowa Gold Mine.

Corn, W. R. DODSON and V. L. ROY (*Louisiana Sta. Bul. 118, preliminary part, pp. 2-16*).—This publication, which will form a portion of a bulletin covering the general subject of corn production in Louisiana, gives directions for selecting, grading, and storing seed corn, and preparing exhibits. An explanation of the score card and rules and regulations for judging are also included.

Manurial experiments with cotton in the Leeward Islands, H. A TEMPANY (*West Indian Bul., 10 (1910), No. 3, pp. 269-273*).—The results of 5 years' experiments indicate that under conditions prevailing in the Leeward Islands with soils in moderately good tilth, the application of artificial and natural manures to Sea Island cotton is unremunerative.

[Shrinkage of hay in the stack], B. N. WALE (*Jour. Southeast. Agr. Col. Wye, 1908, No. 17, p. 44*).—On July 26, 124 lbs. of hay was placed in a hop pocket in the center of a stack. By November 2, after undergoing normal fermentation, it had lost 21½ lbs. or 17.33 per cent.

The cultivation of hemp in the United States, L. H. DEWEY (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 57, pp. 7, fig. 1*).—This circular discusses the climatic and soil requirements of hemp and gives directions for sowing, harvesting, retting, and breaking. The total cost per acre is estimated at $30 and the gross returns at $50.

"Hemp can not be grown profitably in small isolated areas. Two hundred acres or more should be grown on one or more farms near together, so as to warrant the introduction of special machinery for drilling, harvesting, breaking, and baling, and also make it possible to ship the fiber in full car lots.

"Before undertaking the cultivation of hemp on a commercial scale it is advisable to try some preliminary experiments with half an acre or less, to determine whether the local conditions are adapted to the crop."

Characteristics of some varieties of oats, E. GROSS (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 9, pp. 666-670*).—Studies of the characteristics of Nonplus Ultra, Ligowa, Milner, Mortgage Lifter, Meteor, and Duppau varieties of oats are given, including the tillering power, ratio of straw to panicle, grain to straw and chaff, and grain to chaff, the number of kernels per plant and per panicle, the weight per thousand kernels from selected plants, and the yield per hectare.

Report on experiments with potatoes, 1909, J. G. STEWART (*Edinb. and East of Scot. Col. Agr. Bul. 20, pp. 12*).—Among the early varieties tested Macpherson produced the highest total yield, 8 tons 10 cwt. per acre of excellent cooking quality, while among the medium early varieties, Dalmeny Acme produced a yield of 6 tons 15 cwt. of fair cooking quality, and Dalmeny Gem produced from new seed a yield of 8 tons 14 cwt. of very good cooking quality. Among the late varieties, Northern Star produced a yield of 10 tons 5 cwt. of inferior cooking quality, while Dalmeny Hero produced 11 tons 6 cwt. and 3 qr. of good cooking quality. All were practically free from diseased tubers.

Large sets produced a slightly larger crop than did small sets. At only one center out of five did spraying give a favorable result, but at that center the "soda" spray proved more satisfactory than the "lime" spray. An application of 1 cwt. of sulphate of ammonia, 4 cwt. of superphosphate, and 1 cwt. of sulphate of potash was followed by a yield of 4 tons 2½ cwt. greater than that secured from soil to which no artificial fertilizers were applied and 14¾ cwt. greater than that to which the same mixture was applied in addition to 1 cwt. of carbonate of magnesia. The substitution of 1¼ cwt. of calcium cyanamid for 1 cwt. of sulphate of ammonia in this formula resulted in a yield of potatoes lower by 1 ton 8¼ cwt.

Results of experiments in potato culture, A. CADORET (*Prog. Agr. et Vit. (Ed. 'Est-Centre), 31 (1910), No. 8, pp. 236–241*).—This article presents the results of variety and fertilizer tests conducted with potatoes, including the work of 10 different investigators.

The rice growing season of 1908–9 in Cochin China, E. M. DE FLACOURT (*Bul. Econ. Indo-Chine, n. ser., 12 (1909), Nos. 79, pp. 343–353; 80, pp. 540–552*).—This article discusses early and late rice, the acreage devoted to rice, and the price of paddy and of rice during the first and the last half of each month of the year in each province of Cochin-China.

Comparative study of the chemical composition of the rice of Iguape and that of other regions, L. GRANATO (*Bol. Agr. [São Paulo], 10. ser., 1909, Nos. 8, pp. 631–645; 9, pp. 724–738*).—Many analyses by Silvestrini of the grain, straw, and hulls of 11 different varieties of rice are given. Varieties grown in different regions and countries are compared as to chemical composition and food value.

[The relation between the time of blooming and harvest of winter rye], E. IHNE (*Arb. Deut. Landw. Gesell., 1909, No. 161, pp. 43*).—General observations of the time of blooming of plants and their practical application are given and figures presented for the years 1887, 1888, 1891, 1893, and 1894 to show that the early blooming of rye in the Grand Duchy of Hesse has been followed by a greater yield than has late blooming. It is also stated that early blooming is never followed by a late harvest and that late blooming is never followed by an early harvest.

Sugar cane in Porto Rico, D. W. MAY (*Porto Rico Sta. Bul. 9, pp. 7–40, pls. 3*).—This bulletin reviews variety, fertilizer, and cultural tests with cane elsewhere and reports similar trials in Porto Rico, together with brief notes on cultural and grinding practices and cane diseases.

It was found that all seed cane should be treated before planting. When the seed was put in a tank and water and a few shovelfuls of lime added, the canes germinated more readily and were freer from disease. All imported canes were treated with Bordeaux mixture and this is recommended for use in Porto Rico with all canes.

Yields of 36.6 tons per acre were secured at the station from plantings of 3 seed in holes 7½ ft. apart, 49.8 tons from a planting of the same amount of seed 2½ ft. apart in furrows in which the seed was planted on end, and 54.1 tons from horizontal plantings wholly covered in furrows in a continuous row. Mole crickets damaged the canes planted in continuous rows and necessitated replanting in a few spots. At Central Aguirre, Otaheite cane yielded 49.76 tons per acre and Christalina 60.56 tons when planted in holes, as is usual in Porto Rico, while the same varieties planted in continuous furrows, as in Hawaii, produced 50.36 tons and 71.48 tons, respectively. The Hawaiian system produced an estimated yield of 406 lbs. more sugar per acre with Otaheite cane and 407 lbs. more with Cristalina cane.

Cane planted 10 ft. apart each way yielded 32.4 tons per acre, 7½ ft. apart each way 37 tons, and 5 ft. apart each way 40.7 tons, while the yields of rattoon cane were 26, 30.9, and 33.3 tons per acre, respectively. Experiments on heavy, medium, and light fertilization of cane planted at these distances showed that close planting is more profitable because of the larger yields of cane, greater economy in cultivation, and less favorable conditions for the growth of grass and weeds. Heavy fertilization was followed by greater differences in yield between the wide and narrow plantings.

During 3 years' experiments in which the yield of the check plats was considered as 100, the relative yields of plant cane and rattoons following applica-

tions of various fertilizers were nitrogen 111.75, phosphorus 109.66, potash 114.11, nitrogen and phosphorus 118.18, nitrogen and potash 119.38, phosphorus and potash 113.29, and nitrogen, phosphorus, and potash 113.63. It appears that when lands have rested for some years the rattoons need more fertilizers than the plant cane and that for these a complete fertilizer is best.

Plats planted at various distances and limed at a cost of $1.28 per acre produced an increased yield valued at $7.15 per acre, but the limed plats produced lower yields of rattoons than those not limed. It is recommended that heavy clay lands be given an application of burnt lime followed by an annual application of a complete fertilizer with nitrogen as the principal element. In another experiment the check plat yielded 44 tons per acre; plats limed at the rate of 500 lbs. per acre with and without fertilizer produced yields of 57 and 50 tons, respectively; and those limed at the rate of 3,000 lbs. per acre with and without fertilizer yielded at the rates of 62 and 69 tons, respectively. Wet swamp land, tile drained and planted at distances of 10 ft. apart each way, produced yields of 56.1 tons and 39.8 tons per acre, respectively, when limed with 5 gal. per hill of burnt lime and the same amount of unburnt lime. The unlimed cane yielded 24.9 tons per acre. The lime used in this experiment was a Porto Rico soft coral limestone.

Porto Rico caves contain large deposits of very rich bat guano, some of which contains over 20 per cent of phosphoric acid. This material was tested in comparison with lime, each being used in the quantity of 1 shovelful per hill on plats on which the hills were 5 ft. apart each way. The guano plat gave 40½ lbs. of cane per hill, while the lime and check plats each gave 33 lbs. per hill. In another experiment an application of ½ liter of guano and ½ liter of burnt lime per hill was followed by a yield of 42.7 tons per acre; of 1 liter of guano, by 47.6 tons; of 1 liter of lime, by 43.6 tons; and from the check plat of 36 tons.

Tests of 4 complete fertilizers at the station indicate that nitrogen is the element most needed by the soils of that section. The results with potash and phosphorus were lower than with no fertilizer. Tests of lime and of 5 complete fertilizers at Hormigueros indicate that the soils in that vicinity are not in proper physical condition to give good returns from an application of fertilizers, but that these soils should be heavily limed to improve their physical condition. Negative and variable results were also obtained at Santa Rita, Central Ingenio, and Central Merceditas, as the soils were not in a condition to respond to heavy applications of fertilizers. Five experiments conducted at Guanica Centrale indicated that tankage was a more effective source of nitrogen than sulphate of ammonia or nitrate of soda, and the 2 experiments in which calcium cyanamid was used indicated that this fertilizer was more effective than any of the others. At Mayaguez, nitrogen produced a greater profit with plant canes than with rattoons, but the reverse was true of phosphorus and of potash.

The loss of weight in shipping was found to vary from 5.8 to 8 per cent. Purity percentages show a rapid deterioration in the value of canes after cutting. The average loss arising from delays of from 12 hours to 6 days is estimated at 10 cts. per ton.

Report on wheat growing in Verrières in 1909, P. DE VILMORIN (*Bul. Soc. Agr. France, 1910, Apr. 1, Sup., pp. 42–48*).—The yields per acre of straw and grain, the quality of straw, tillering power, resistance to lodging and diseases, the form of the ear, and the earliness of 38 varieties of fall wheat and 11 varieties of spring wheat are given in this article.

A quantitative method for the determination of hardness in wheat, H. F. ROBERTS (*Kansas Sta. Bul. 167, pp. 371–390, figs. 9*).—Hardness in wheat is considered indicative of superior milling quality, and this bulletin describes an

apparatus designed to determine the mean crushing point of the wheat kernel. It is hoped to ascertain the correlation existing between hardness of the kernel and the chemical and physical characters of the gluten.

A thorough investigation of 2 pure strains of wheat, one hard, the other soft, indicated that a sufficiently correct average mean crushing point for a given pure strain or variety could be reached by taking the mean of the crushing points of 350 kernels. "Soft" wheats generally crushed under a pressure of 6,000 gm. or less (13 lbs.), "semihard" wheats under about 9,000 gm., and "hard" wheats at 12,000 gm. or over.

Fertilizers for wheat soils, M. WHITNEY (*U. S. Dept. Agr., Bur. Soils Bul. 66, pp. 48, figs. 28*).—This bulletin gives a compilation of the yields of wheat on unfertilized soils and on soils fertilized with various materials in 3,227 individual plat tests reported by the state agricultural experiment stations for the years 1869–1907.

The yields of check plats are compared with those of the fertilized plats and valuations and results given for the 45 different materials tested singly and in various combinations. The applications of these different classes of fertilizers resulted in average losses ranging from $1.43 to $4.58 per acre except in the case of applications of manure and compost where the average gain per acre was 17 cts. Though the duplicate check plats showed such wide variations that considerable latitude is necessary in the interpretation of all results, the chances for an increase in the yield of wheat are deemed greater with two or three fertilizers mixed than with single fertilizers. Small applications of single fertilizers gave in general no less an increase than the larger amounts, and an equal increase in crop was indicated for the same fertilizers on good soils as on unproductive soils.

Brief accounts of fertilizer plat tests on the same soil for a long period of years at the Ohio and Pennsylvania stations, and at the Rothamsted Station in England are also given and discussed, considerable yearly variation being pointed out.

Report of the test of chemical fertilizers in Greece, T. N. MELINDONAS (*Deltion Hellanikas Georgikas Hetaireias, 1 (1909), No. 12, pp. 344–347, fig. 1*).—The application of fertilizer containing from 3 to 3½ per cent of nitrogen, 10 to 11 per cent of phosphoric acid and 11 to 12 per cent of potassium nitrate was followed by a yield of wheat worth 128 drachmas per stremma ($100 per acre) as compared with a yield valued at 58 drachmas per stremma on the check plat.

Experiments on tillering and thick against thin sowing of Red Fife wheat, R. N. DOWLING (*Jour. Southeast. Agr. Col. Wye, 1908, No. 17, pp. 49–56*).—Plats of Red Fife wheat drilled in rows 6 in. apart and at the rates of 1, 2, 3, and 4 bu. per acre showed a tendency to tiller and to rust decreasing as the rate of sowing increased, but a plat sowed at the rate of 2½ bu. per acre in rows 12 in. apart excelled all others in tendency to tiller and gave a yield of grain and straw slightly less than that sowed at the rate of 3 bu. per acre. The maximum yield was produced on the plat sowed at the rate of 4 bu. per acre. From a similar weight of seed Red Fife produced more stems than Essex Conqueror, but the English wheat had a higher percentage of tillering and yielded 18 bu. more grain per acre.

[On seed analysis, inoculation of leguminous crops, spraying experiments, and grain breeding], F. G. STEBLER (*Landw. Jahrb. Schweiz, 24 (1910), No. 1, pp. 24*).—The results of purity and germination tests of seeds of varieties of clover, alfalfa, grass, forest trees, and forage and fodder crops at the Seed Control Station at Zürich are reported. Mechanical analyses of the soils

of 4 experiment fields are given and results of inoculation of lupines and soy beans presented in tabular form. In spraying experiments Bordeaux mixture and Cucasa, a proprietary mixture, resulted in approximately equal yields. A brief review of grain breeding work is given.

Some analyses of seeds, G. GASSNER (*Rev. Secc. Agron. Univ. Montevideo, 1908, No. 4, pp. 107–115; Rev. Inst. Agron. Montevideo, 1909, No. 5, pp. 95–105*).—Germination and purity tests of samples of seed of alfalfa of 9 different classes are given in connection with the market price and cultural value of these seeds. Dodder (*Cuscuta racemosa*) was found only in the seed from Argentina, but the opinion is expressed that seedsmen prevented the securing of representative samples. The percentage of impurity reported ranged from 0.83 to 3.54 per cent. The cultural value reported, which is the product of the purity percentage and the germination percentage, ranged from 56.14 to 92.17 per cent.

The germination percentage of 6 varieties of clover and the principal impurities present are reported in tabular form. The cultural value ranged from 12.8 to 82.7 per cent.

Impurities of grass and clover seed sold in Virginia, GERTRUDE B. DE LOACH, L. CARRIER, and T. B. HUTCHESON (*Virginia Sta. Bul. 184, pp. 3–18, figs. 14*).—The results of purity and germination tests of red clover, crimson clover, timothy, redtop, and orchard grass are presented in tabular form and lists of the principal weed seeds found in each given with a statement of the frequency of occurrence of each kind of weed seed, and discussion of methods of testing seed in the laboratory and on the farm.

Trials with spraying machines for iron sulphate solutions, 1909, C. V. BIRK and M. DALL (*Tidsskr. Landökonomi, 1909, No. 12, pp. 649–667, figs. 2*).—Brief descriptions of seven power or hand spraying machines tested and found to do satisfactory work with iron sulphate and Bordeaux solutions are given. The strong and weak points of each are indicated in a summary of the opinion of the judges.

References to recent work in plant breeding, C. FRUWIRTH (*Jour. Landw., 57 (1909), No. 3, pp. 287–306*).—A review is given of numerous publications on plant breeding.

HORTICULTURE.

Report of the horticulturist, J. E. HIGGINS (*Hawaii Sta. Rpt. 1909, pp. 47–57, pls. 3*).—In addition to the marketing experiments with pineapples previously noted (E. S. R., 21, p. 45), considerable attention was given to methods of propagating citrus fruits and mangoes, and studies were begun to determine the most satisfactory methods and season for budding the avocado.

The causes which are believed to be chiefly responsible for the numerous failures reported in budding citrus trees are given as poor bud wood, lack of vigor in the stocks, and insect attacks. Scale insects and mealy-bugs were combated more successfully and cheaply by fumigating with hydrocyanic-acid gas than by the use of kerosene emulsion. Remedies are also suggested for climbing cutworms, *Archis postvittanus*, and aphids. It is recommended that those who have difficulty in budding should adopt the shield method with the inverted "T," so successfully used in propagating the mango (E. S. R., 22, p. 642.)

Citrus stocks of rough lemon, sweet orange, shaddocks, and seedlings from California grown pomelos are being tested, each important variety of orange, lemon, or pomelo being budded on each of these stocks. Buds inserted during January, February, March, and April appeared to be equally successful, pro-

vided the individual trees were in active growth, although the buds set early in the year were ahead in point of growth.

Although the inarching method of propagating the mango has been to a large degree supplanted by budding, inarching is still considered very useful in propagating valuable trees that have become pot-bound or otherwise stunted.

The use of cover crops on the slopes in the station orchards during the rainy season has become an established practice. The jack bean and cowpea of the clay type have given the best results of any legumes tested. The pigeon pea (*Cajanus indicus*), although a valuable leguminous plant, grows too tall and woody to be turned under easily.

In some tests in drying roselle fruits with the view to making them less bulky and less susceptible to decay during shipment, it was found that 12.8 lbs. of the fresh fruit were required to produce 1 lb. of dry calyces. It is calculated that to pay as well as the fresh fruit the dry calyces can not be sold for less than 45 cts. per pound plus the cost of drying. Since less than half this price was offered for them by preserving companies on the mainland, it appears more profitable to market the Hawaiian roselle directly in the form of jams and jellies.

An outline is given of the system used by the horticultural division in keeping records of plantings and the life history of plants.

Report of professor of horticulture, P. J. Shaw (*Ann. Rpt. Sec. Agr. Nova Scotia, 1909, pt. 1, pp. 38–57, fig. 1*).—This consists of an outline of the educational work conducted at the agricultural and normal colleges in Truro, together with a statement of the condition of the model orchards located throughout the Province.

Bean growing, W. F. Raven (*Michigan Sta. Bul. 259, pp. 89–96*).—This bulletin contains information relative to the ordinary cultural methods employed in growing the field bean under Michigan conditions. It discusses the suitability, preparation and fertilization of soils, varieties, cultivation, harvesting, marketing, and threshing, and diseases of beans. Tables are also given showing the acreage, yields, and average prices paid Michigan farmers for beans for each month during a 10-year period.

Nursery stock and soils pertaining to the production of types and sizes, O. G. Wilson (*Spec. Crops, n. ser., 9 (1910), No. 93, pp. 333–337, figs. 3*).—Illustrations are given of favorite types of ginseng roots as grown by the author, together with a discussion of the principles to be observed in order to raise good roots, which are given as proper soil, deep high beds with the proper mulch, and absence of the most rainfall during the first season.

Fertilizer experiments with tomatoes, K. Weydahl (*Norges Landbr. Hoiskoles Skr., 1909, No. 9, pp. 14, pls. 4*).—Pot experiments with tomatoes are reported in which it was shown that the tomato plant makes heavy demands on the supply of easily available nitrogenous fertilizers in the soil but requires only light supplies of phosphoric acid and potash.

German fruit culture, R. Goethe, F. Ihne et al. (*Arb. Deut. Landw. Gesell., 1908, No. 150, pp. XIV+320+8, figs. 104, maps 2*).—This is essentially a manual of information relative to the German fruit industry.

Part 1 contains the results of the German fruit tree census for the year 1900, together with short descriptions of fruit growing in the various kingdoms and provinces of the German Empire. In part 2 consideration is given to climate, soils, and tree physiology. Part 3 takes up the details of intensive and extensive fruit growing, including information relative to the requirements of various fruits, varieties and races, planting operations and subsequent orchard management, and combating insect pests, diseases, and other enemies. Part 4 discusses imports and exports of fruits, yields, marketing, commerce, and profits. Part 5

contains descriptions of various fruit plantations and estates and of community fruit growing, as well as the culture of fruit trees along streets, railways, and canals.

The cold storage of apples and other fruits, J. A. RUDDICK (*Canada Dept. Agr., Branch Dairy and Cold Storage Comr. Bul. 23, pp. 8–20, figs. 5*).—This is a discussion of the possibilities of cold storage as an aid to the fruit growing industry in Canada, including information relative to varieties of fruit adapted to cold storage, methods of storing fruit, the construction of cold storage warehouses, and ice storages on farms.

Apple growing in New England. III, Planting the apple orchard, C. D. JARVIS (*Connecticut Storrs Sta. Bul. 62, pp. 97–139, figs. 29*).—This is the second of a series of bulletins issued by the station relative to apple growing in New England (E. S. R., 22, p. 735). It discusses in detail the selection of location, soil, nursery stock, and varieties, preparing the land, laying out the orchard, planting operations, and subsequent care of the orchard.

Apple culture, C. P. CLOSE (*Maryland Sta. Bul. 144, pp. 217–265, figs. 31*).—This is a popular treatise on the growing and marketing of apples with special reference to Maryland conditions. Consideration is given to the natural conditions and soil of Maryland, improving soils, selection of seed, preparation of land, planting operations, details of culture and management, harvesting, grading and packing, storage, and orchard heating. Lists are given of the best varieties for home use and for marketing, together with a descriptive list of some 85 varieties which have been grown in the State and are of more or less value. A detailed statement by E. P. Cohill is given relative to the cost of starting and maintaining a 7-year-old 30-acre orchard.

Notes are also included on apple insects and diseases.

Olive culture in Algeria, E. VIVET (*École Agr. Algér. Maison-Carrée, Inform Agr. Bul. 10, pp. 42, figs. 7*).—A popular treatise on olives with special reference to their culture in Algeria. It treats of varieties, adaptation to climate and soil, grafting, planting, pruning, fertilizers, insect pests and diseases.

Plum varieties, E. E. LITTLE (*Iowa Sta. Bul. 114, pp. 121–149, pl. 1, figs. 10*).—This bulletin is essentially a progress report for the past 10 years as to the large number of varieties of plums being tested at the station (E. S. R., 12, p. 240). It also discusses the propagation of the plum, soils, planting, pruning, thinning, culinary uses, selection of varieties, ripening season of the fruit, and classification. The descriptive list gives information for each variety, relative to its hardiness, the extent to which it is grown in Iowa, and its adaptability, liability to disease, origin where known, character of the tree and fruit, and synonyms and references, the more promising varieties being described most in detail.

Plum varieties, E. E. LITTLE (*Iowa Sta. Bul. 114, pp. 3–8, figs. 2*).—A popular edition of the above.

Strawberry cultivation (*Bd. Agr. and Fisheries [London], Leaflet 207, pp. 6*).—This leaflet contains popular directions for growing strawberries with special reference to English conditions.

Handbook of grape growing and wine making, A. VON BABO and E. MACH (*Handbuch des Weinbaues und der Kellerwirtschaft. Berlin, 1910, vol. 1, 2. half, 3. ed., pp. XVI+625–1418, figs. 520*).—This half of volume 1 (E. S. R., 22, p. 144) takes up the methods of training and supporting grapevines, cultural operations in the vineyard, the insect pests and diseases of grapes, harvesting and pressing, by-products of the grape industry, the employment of labor, and the financial phases of viticulture.

Summer pruning, G. CHAPPAZ (*Prog. Agr. et Vit. (Éd. l'Est-Centre), 31 (1910), No. 22, pp. 645–649*).—A brief study of the practices of removing super-

fluous shoots, pinching back, and girdling grapevines, with reference to their importance to the French vineyardist. The author concludes in substance that these are all special practices, and although of some value under certain conditions, they should not be generally employed in the production of wine grapes.

Coffee plantations of Tonkin, P. J. S. CRAMER (*Philippine Agr. Rev.* [*English Ed.*], *3* (*1910*), *No. 2, pp. 94–100*).—This is an English translation of a report presented to the Governor-General of Indo-China (E. S. R., 21, p. 637).

The tea plats at the experiment station, Peradeniya (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5* (*1910*), *No. 1, pp. 12, pls. 4*).—A descriptive account of these plats, discussing the conditions of soil and climate, pruning, cultivation, manuring experiments, and yields under varied treatment. Tabular data are given showing soil analyses and yields in pounds of made tea from the various plats planted in July 1903, and since treated with various manures and cover crops.

The kola nut tree in French Guinea, H. LEROIDE (*Agr. Prat. Pays Chauds, 10* (*1910*), *No. 85, pp. 268–288*).—A study of the kola nut tree in French Guinea, relative to its distribution, uses, and methods of culture.

Pistachio culture, J. BRICHET (*Bul. Dir. Agr. Com. et Colon.* [*Tunis*], *14* (*1910*), *No. 54, pp. 55–62*).—A brief account of the pistachio trees, relative to their botany, culture, and products.

The garden primer, GRACE TABOR and G. TEALL (*New York, 1910, pp. 118, pls. 29, figs. 7*).—This is a practical handbook on vegetable and ornamental gardening. It discusses sorts of plants, soils, garden nomenclature, seeds and sowing, seedlings and transplanting, cultivation, fertilization, pruning, hotbeds and coldframes, garden pests and spraying, and garden tools. Planting tables intended to apply to various sections of the country are also given for flowers and vegetables, together with a gardener's calendar and a spraying table for garden pests.

Propagation and pruning of ornamental plants, S. OLBRICH (*Vermehrung und Schnitt der Ziergehölze. Stuttgart, 1910, 2. ed., rev., pp. VII+241, figs. 133*).—This is a practical treatise on the propagation of ornamental trees and shrubs. Following a detailed discussion of the different methods of propagation, the plants are arranged in alphabetical order and discussed relative to their specific treatment. The pruning and training of shrubs in various forms is also discussed in detail and information is given relative to distinguishing characteristics in winter and the autumn leaf coloration of the different plants.

Some beautiful flowering trees of the Tropics: Their utility and hygienic effects, H. F. MACMILLAN (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 4* (*1909*), *No. 20, pp. 179–188*).—The author briefly reviews the utility and hygienic effects of trees in general and gives brief descriptions of a large number of tropical flowering trees.

FORESTRY.

Report of state forester upon forest conditions in central and western Kansas, A. DICKENS (*Kansas Sta. Bul. 165, pp. 293–355, figs. 37*).—This report presents the text of the law establishing a division of forestry at the Kansas College and the results of forestry operations conducted at the Ogallah and Dodge City forest substations, and sums up the author's experience of over 20 years of observations and study of the forest conditions in central and western Kansas.

The work at the substations has consisted for the most part of growing and distributing various tree seedlings. Notes are given on a number of species of

trees included in demonstration plantings started at the substations, and on the catalpa plantations made at the college, the earliest of which were started in 1872. Owing to its great value as a tree for western Kansas, the catalpa is discussed somewhat in detail relative to its identification and culture, a number of extracts from a former bulletin of the station (E. S. R., 14, p. 153) being included.

Report of the minister of lands and forests of the Province of Quebec for the twelve months ending June 30, 1909, J. ALLARD (*Rpt. Min. Agr. Prov. Quebec, 1909, pp. IX+202, pls. 8*).—In connection with a brief general report on the operations of lands and forests for the year ended June 30, 1909, a large number of tabular statements made by the officers in charge are appended, showing the receipts and expenditures of the department from various sources, licenses granted and other routine matters, revenues, results of forest protection work, forest surveys, and the control of water powers, together with considerable miscellaneous information.

Official proceedings of the division of forestry of the Royal Prussian Ministry for Agricultural Domain and Forests, 1908 (*Amtl. Mitt. Abt. Forsten K. Preuss. Min. Landw.* [*etc.*], *1908, pp. IV+47*).—This consists of a statistical review of forest operations and conditions in Prussia for 1908 with comparative data for a few previous years. The data give information relative to imports and exports of forest products, areas, yields, and revenues, and considerable miscellaneous information.

Review of forest conditions in 1908, SEMPER (*Ztschr. Forst u. Jagdw., 42* (*1910*), *Nos. 4, pp. 195–215, 5, pp. 293–316*).—A statistical review of forest conditions in Prussia for 1908, consideration being given to the general situation, forest areas, present conditions, silviculture, forest protection, utilization and yields, timber trade, wood using industries, wood transportation, forest officers and workmen, and hunting and forestry.

Forest taxation in Germany, A. ARNOULD (*Rev. Eaux et Forêts, 49* (*1910*), *No. 11, pp. 328–339*).—A study of the systems of forest taxation in vogue in the German Empire.

Forest conditions in Baden, K. PHILIPP (*Die forstlichen Verhältnisse Badens. Freiburg, 1909, pp. 39*).—In view of considerable criticism relative to the administration of the forests in Baden, the present contribution is offered as a critical examination of forest conditions in that country with a view to seeking out methods by which the forest stands may be improved and the revenues increased.

Proceedings of the Bavarian State Forest Administration (*Mitt. Staatsforstverw. Bayerns, 1908, No. 8, pp. 193*).—A statistical report on the administration and condition of state, private, community, institutional, and corporation forests in Bavaria, largely for the year 1906 and the few preceding years, although data relative to the returns from various forests are given up to the year 1908.

Some features of Bavarian forestry, A. C. FORBES (*Dept. Agr. and Tech. Instr. Ireland Jour., 10* (*1910*), *No. 3, pp. 477–484, pls. 6*).—A brief descriptive account of Bavarian forestry relative to the constitution of the forests and their administration, silvicultural and experimental work, forest protection, education, and related matters.

Report of the forestry bureau of Norway, 1908, M. SAXLUND (*Indber. Norske Skogv., 1908, pp. XXXIX+162, figs. 6*).—The report contains a general account of the work done by the bureau during the year, together with reports by the various officials of the bureau relative to operations at tree-planting and forestry schools. The report of the state entomologist, W. M. Schöyen, on injurious insects and fungus diseases on forest trees for 1908 is also included.

Reports on the forest administration in Burma for the year 1908–9 (*Rpts. Forest Admin. Burma, 1908–9, pp. 207+6*).—This is the usual annual statement of operations in the state forests of the Pegu, Tenassarim, Northern and Southern circles of Burma, including information relative to alterations in forest areas, forest settlements, surveys, protection, silvicultural operations, exploitation, financial results, and administration work. Important features of the work are appended in tabular form.

The plateau of the San Francisco peaks in its effect on tree life, P. Lowell (*Bul. Amer. Geogr. Soc., 41 (1909), Nos. 5, pp. 257–270, figs. 10; 6, pp. 365–382, figs. 10*).—A study of the zonal distribution of different trees in the San Francisco region of the Colorado plateau.

The author finds that the thinness of the air offers no obstacle to the tree's growth. Slope exposure has a decided influence on the maximum and minimum altitude of a given species, and the mass of land at a given height also influences zonal distribution. The greater the land mass under them, the more uniform are the tree zones in altitude. In the lower zones where the land mass is greater, the tree zones actually rise on the north even against the effect of slope exposure. This is attributed to a greater generation of warmth in the large mass of plateau soil.

Studies in Norway, H. Perrin (*Rev. Eaux et Forêts, 49 (1910), Nos. 9, pp. 262–276, figs. 3; 10, pp. 289–303, figs. 13*).—This comprises the results of a study of silviculture and timber exploitation in Norway. The subject matter is discussed under the general headings of a general account of Norwegian forests, their administration, forest legislation, etc., the species and stand, culture, reforestation and management, exploitation, forest industries, and commerce.

[The Russian timber industry], J. H. Snodgrass (*Mo. Cons. and Trade Rpts. [U. S.], 1910, No. 357, pp. 75, 76*).—Data are given on the forest wealth and the lumbering industry in the Russian Empire.

The coastal forests of Cameroon, M. Busgen (*Ztschr. Forst u. Jagdw., 42 (1910), No. 5, pp. 264–283, pl. 1, figs. 3*).—A descriptive account of this forest is given relative to its constitution, extent, species of economic value, and similar points.

Soil changes effected by afforesting impoverished farm lands, Fricke (*Ztschr. Forst u. Jagdw., 42 (1910), No. 5, pp. 259–264*).—Investigations of soils taken from impoverished farm lands which have been reforested with pine trees lead the author to conclude that the first generation of trees is of little value in adding humus to the soil for the use of the second generation of trees. The soils studied were of a medium-grained quartz sand formation. The litter deposited on the surface of the soil can only become of value to the succeeding generation of trees by incorporation with the mineral soil through cultural methods, which methods are generally out of the question in forest operations.

Sowing or planting? D. Frömbling (*Forstw. Centbl., n. ser., 32 (1910), No. 5, pp. 253–271*).—A discussion of the relative merits of establishing forests by means of seed and by the use of nursery grown plants.

[Tree planting and maintenance after planting], Herrington (*Proc. N. Y. Farmers, 1909–10, pp. 5–20, pls. 14*).—An address, with the accompanying discussion, delivered before the New York Farmers' Club in which consideration is given to the commercial methods of transplanting, planting, and maintaining large ornamental and forest trees, and also including a popular discussion of the diseases of trees.

The vitality of pine seed in serrotinous cones, J. C. Blumer (*Torreya, 10 (1910), No. 5, pp. 108–111*).—A discussion of this subject based on the observations of the author and other investigators.

The black poplar (Populus nigra), N. Skalosubow (*Trudui Byuro Prikl. Bot., 3 (1910), No. 2, pp. 43, 44*).—According to this note the bark of the black poplar is extensively used in Russia in making floats for fish nets.

The landolphias and the rubber yielding mascarenhasias, H. Jumelle and H. Perrier (*Les Landolphia et les Mascarenhasia à Caoutchouc du nord de L'Analalava. Paris, 1910, pp. 46, map 1*).—A descriptive account is given of the forest regions in northwest Madagascar with special reference to the rubber yielding landolphia vines and mascarenhasia trees.

Risks, mistakes and improvements in the rubber production of Asia, D. Sandmann (*Tropenpflanzer, 14 (1910), Nos. 3, pp. 117-140; 4, pp. 180-206, figs. 17*).—The author reviews the beginnings and improvements in the plantation rubber industry of tropical Asia, consideration being given to the various species, cultural details, harvesting, and coagulating the latex.

Analytical investigation of the conception of wood hardness, N. von Lorenz (*Analytische Untersuchung des Begriffes der Holzharte. Vienna, 1909, pp. 41*).—A theoretical study in which the author endeavors to work out a system of formulas and equations for measuring form pressure and hardness pressure in conducting hardness tests of woods. The application of the various formulas is discussed in connection with a number of hardness pressure tests conducted by G. Janka at the Mariabrunn Forestry Station (E. S. R., 18, p. 341), in which prism, wedge, cone and bullet shaped pressure bodies were used. The author endeavors to show to what extent theory has conformed with actual experience as well as the possibility of completing the theory of form pressure and resistance by means of pressure experiments.

DISEASES OF PLANTS.

Report of the mycologist, 1907-1909, E. J. Butler and W. McRae (*Rpt. Agr. Research Inst. and Col. Pusa [India], 1907-1909, pp. 63-68*).—Following a description of the institution, its laboratories, and organization, brief accounts are given of the research work that has been begun. This includes studies of disease of sugar cane, coconut palms, citrus fruits, various wilt diseases, and a mulberry disease.

The authors state that the sugar cane disease most prevalent is the red rot, and progress is being made in working out the life history and methods of infection of this disease. In addition the life histories of two other sugar cane parasites are being investigated.

Successful inoculations with the parasite causing one of the most destructive palm diseases have been secured. The disease of citrus fruits which is occupying most attention is that called white rust, which has proved quite destructive to valuable orange orchards in a number of localities. The disease is said to be identical with that which has recently appeared in southern Europe, and apparently can be avoided by the choice of stock in grafting citrus plants.

In a study of wilt diseases the authors' attention has been called to wilt of cotton, indigo, pigeon peas, and chick peas. In all of these the fungus to which the cotton wilt of the United States is attributed was present, but the experimental work has thrown doubt on the parasitism of this species. An entirely distinct organism was isolated from the pigeon pea and infection experiments have shown it to be the cause of the disease in this crop. This organism has been described as *Fusarium udum*. A detailed account of the investigations is to be published later. The experiments indicate the possibility of obtaining a resistant strain of pigeon pea. The cause of the wilt disease of the chick pea has been definitely determined.

Report on economic mycology, E. S. SALMON (*Jour. Southeast. Agr. Col. Wye, 1908, No. 17, pp. 247–356, pls. 17*).—This report contains observations on the American gooseberry mildew, black scab or wart disease of potatoes, black scab or spot of apples (E. S. R., 20, p. 950), apple leaf spot (E. S. R., 19, p. 549), cherry leaf curl (E. S. R., 20, p. 248), leaf spot of chrysanthemums (E. S. R., 19, p. 659), Rhizoctonia disease of sea-kale (E. S. R., 20, p. 451), and infection experiments with *Chrysophlyctis endobiotica.*

In the discussion of the American gooseberry mildew and the black scab or wart disease of potatoes, the author traces the distribution of the fungi, calls attention to their destructiveness, and suggests means for their control.

In the infection experiments with Chrysophlyctis, the fungus causing the black scab or wart disease of potatoes, it was found that if resting spores are subjected in November to temperatures varying from —5° to —6° C. for 1¾ hours they are able to germinate and infect sprouting potatoes at once. Further experiments showed that exposure for 4 hours to a temperature of —5° to —8° did not destroy the germinating power of the resting spores, and this is believed to show that winter plowing of soil infested with the disease is useless as a means of destroying the spores.

Diseases of the cultivated plants for the years 1906–1908, L. HAUMAN-MERCK and J. A. DEVOTO (*Bol. Min. Agr. [Buenos Aires], 10 (1908), No. 1–2, pp. 98–113; abs. in Centbl. Bakt. [etc.], 2. Abt., 25 (1909), No. 19–25, p. 520*).—This gives a list of 43 diseases, mainly on field, forage, orchard and truck crops, distributed as follows: Phycomycetes 7 species, Ascomycetes 12, rusts and smuts 17, imperfect fungi 5, a bacterial disease (*Bacillus oleæ*) of olives, and an alga (*Mycoidea parasitica*) parasitic on the leaves of the magnolia.

Six insect pests are noted, of which 4 are aphids, 1 a mite (*Phytophtus vitis*), and a red spider (Tetranychus).

Notes on plant pathology, J. B. POLLOCK (*Rpt. Mich. Acad. Sci., 11 (1909), pp. 48–54*).—Notes are given on *Ganoderma sessile*, a wound parasite on the maple; *Polystictus hirsutus*, a wound parasite on mountain ash; the conidial form of Sclerotinia on the wild black cherry; and on the identity of the European and American forms of *Sclerotinia fructigena*. The latter has been noted elsewhere (E. S. R., 23, p. 150). In addition a new species of Sclerotinia, *S. æstivalis*, occurring on old mummied apples, is described, this species differing from other species of the genus in the time at which the apothecia develop.

Some Alabama plant diseases, F. E. LLOYD, C. S. RIDGWAY, and H. J. CHATTERTON (*Bul. Agr. Dept. [Ala.], No. 32, pp. 22, figs. 8*).—Popular descriptions, together with suggestions for prevention, are given of the pecan disease due to *Fusicladium effusum*, fire blight of pears, apples, etc., caused by *Bacillus amylovorus*, and black rot of grapes (*Guignardia bidwellii*).

Contribution to the fungus flora of middle Russia, A. POTEBNIA (*Ann. Mycol., 8 (1910), No. 1, pp. 42–93, figs. 38*).—This is a list of fungi, mainly parasitic, in which the groups Sphæriales, Sphæropsidales, and Melanconiales are treated at considerable length.

Researches on the loose smut of grains, O. APPEL and E. RIEHM (*Mitt. K. Biol. Anst. Land. u. Forstw., 1909, No. 8, pp. 9–13*).—This is a summary of recent investigations by various writers on the different methods of combating the loose smut of grains. The principal conclusions have been noted elsewhere (E. S. R., 22, p. 48; 23, p. 46).

A bacterial disease of alfalfa caused by Pseudomonas medicaginis n. sp., W. G. SACKETT (*Science, n. ser., 31 (1910), No. 797, p. 553*).—A technical description is given of *P. medicaginis* n. sp., which is held to be the cause of the bacterial disease of alfalfa. Previous notes have been given regarding this disease (E. S. R., 22, p. 46).

An outbreak of club root (Urophlyctis alfalfæ) on alfalfa in Bavaria, G. KORFF (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 7 (1909), No. 21, pp. 157–161, figs. 2*).—The author discusses the characters of this disease, its dissemination, and remedies therefor. See also other accounts of this fungus (E. S. R., 18, p. 151; 20, p. 845; 21 p. 549).

Investigations on the cause and remedies for the heart rot of the sugar beet, W. KRÜGER (*Bl. Zuckerrübenbau, 16 (1909), No. 24, pp. 369–373*).—A brief history of the spread of this disease in Germany is given. The investigations carried on seem to indicate that the condition of the soil and subsoil is a prominent factor in its outbreaks. Poorly drained and nonaerated soils with a strongly alkaline reaction and certain forms of nitrogenous fertilizers were found to favor it. Turf mixed with the soil was found to decrease the virulence of the attacks. The remedies suggested are more humus in the soil and the use of a nitrogen fertilizer which when mixed with the soil will give an acid reaction.

The root rot of beets, G. LINHART (*Monatsh. Landw., 1 (1908), p. 356; abs. in Bot. Centbl., 110 (1909), No. 18, p. 473*).—The value of blanching and soaking the beet seeds as a means of controlling *Phoma betæ* is discussed. The conclusion is reached that as the fungus is found in the soil as well as on the seed coats, the seed treatment alone will not prevent the disease, but that by a careful selection of the least diseased seeds and cultivation in soil free from the fungus, in addition to the usual blanching and soaking treatment of the seed, a sound crop may be produced.

The disinfection of beet seed, L. PETERS (*Mitt. K. Biol. Anst. Land u. Forstw., 1909, No. 8, pp. 25–28*).—Experiments were conducted to prevent seed infection by *Phoma betæ*, which is considered to be the only fungus capable of infecting seedlings from diseased seed.

One hundred seed balls were treated in each case and with the following results. Soaking 20 hours in ½ per cent of dilute carbolic acid gave 28 diseased plants out of 245 germinated. Three-fourths of an hour's soaking in concentrated (25 per cent) hydrochloric acid, carefully rinsing and neutralizing the acid by milk of lime, and then repeatedly washing with water, gave 42 diseased plants out of 255 germinated. Two hours' treatment in formalin water (4 cc. of 40 per cent formalin to 1 liter of water), gave 47 diseased plants out of 260 germinated, and a like period in formalin water (10 cc. of 40 per cent formalin to 1 liter of water) gave 30 diseased plants out of 258, and in formalin water (15 cc. of 40 per cent formalin to 1 liter of water), gave 25 diseased plants out of 237. Twenty-four hours' soaking in a 2 per cent copper sulphate solution gave 18 diseased plants out of 255 germinated, and a like period in a 2 per cent copper soda mixture gave 5 diseased plants out of 242 germinated and in a 2 per cent Bordeaux mixture gave 3 diseased plants out of 201 germinated. Thoroughly heating the soaked seed according to Jensen's method gave 25 diseased plants out of 228. Two heatings for 10 minutes each at 57° C. on two successive days gave 10 diseased plants out of 225 germinated.

As will be noted, several of these treatments lowered the germinating power of the seed balls as the percentage of diseased plants decreased.

Several other disinfecting solutions were tried, such as corrosive sublimate, sulphuric acid, phosphoric acid, potassium permanganate, iron sulphate, potassium sulphid, magnesium sulphate, etc., but they did not prove of any practical value in combating the fungus.

Blackleg, a bacterial disease of the Irish potato, W. J. MORSE (*Maine Sta. Bul. 174, pp. 309–328*).—The results of three seasons' studies of the stem and tuber disease of the Irish potato due to bacteria are given.

This disease, which appears to be rather widely spread in the United States, has thus far not occasioned any great amount of loss. It resembles the disease known as blackleg in Germany, which is attributed by Appel to *Bacillus phytophthorus* (E. S. R., 15, p. 374), and the organism isolated resembles to a considerable degree *B. solanisaprus*, described by Harrison (E. S. R., 18, p. 646). The relationship between the different bacteria and the diseases they cause on the potato is not considered in the bulletin.

The disease, as the name indicates, is characterized by a pronounced blackening of the stem below ground, usually extending 1, 2, or even 3 in. above the surface. Where conditions are very favorable, as during continued wet, cloudy weather, the inky-black discoloration may be found on a portion of the stem for several inches above the ground.

Such losses as have been experienced in Maine are largely confined to the killing of the affected plants before the tubers have reached merchantable size, little or no decay of the mature tubers having been observed.

The organism is distributed through the seed tubers, and it is recommended that these be obtained from regions known to be noninfested. All cracked and injured tubers should be rejected and the others treated with corrosive sublimate or formalin before cutting.

The leaf roll disease and the bacterial ring disease of the potato, W. von Zedtwitz (*Wiener Landw. Ztg., 59 (1909), No. 83, pp. 818, 819; abs. in Centbl. Bakt. [etc], 2. Abt., 26 (1910), No. 4–5, pp. 117, 118*).—The author claims that these two diseases are not identical, since their causes and symptoms are different and plants do not have both diseases at the same time.

In the leaf roll disease the fungus is supposed to be a Fusarium, which causes the leaves to roll and shrivel and reduces the yield materially, both in quantity and size of tubers. The infected tubers are only about one-half their normal size and are soft, while seed potatoes that are apparently healthy are capable of infecting the crop grown from them.

On the other hand, the bacterial ring disease does not seem to diminish the yield or the size of the potatoes, nor to blight the tops of the plants, for tall plants with large yields and potatoes which are rich in starch are the ones usually diseased with the bacterial ring rot, as is shown by the brown areas in the fibro-vascular bundles. This disease is apparently favored by loamy, chalky soils, rich in humus. For its control the author recommends well fertilized fields, fall plowing by means of steam engines to leave the surface rough for the better aeration of the soil, careful selection of seed potatoes, planting the seed whole, and thorough cultivation of the crop.

The leaf roll disease of the potato, O. Reitmair (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 1, pp. 48–52*).—From close observation in the field and from the study of a large number of specimens of diseased plants collected in different localities, the author has reached the following conclusions:

There is no specific death, shrivelling, or discoloration of any organ or tissue of potato plants attacked by the real leaf roll disease of Appel. When such does appear, it is produced by other diseases which may be associated with the leaf roll disease. If any biological changes occur in the conducting tissues of the roots and stems, they are probably due to the rolling of the leaves rather than to any real characteristic of the disease.

In the genuine leaf roll disease, the primary root system has a stunted growth. The laterals are brownish yellow and often crooked with few branches, while the healthy plants produce juicy, thrifty, thick roots, with an abundance of rootlets. This characteristic stunted appearance of the roots and stem parts, the later rolling of the leaves, and the often observed coloring of the

fibro-vascular bundles seem to constitute the most noticeable symptoms of the true leaf roll disease. It was found that plants affected with this disease, under favorable conditions, could put out a new root system and produce a late but fair crop of tubers.

A new smut on sorghum, F. BUBÁK (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 1, pp. 53–56, figs. 2*).—The author figures and describes a new species of smut (*Ustilago bulgarica* n. sp.) on *Sorghum vulgare*, which infests the heads of the common sorghum, filling the ovaries with a greenish-brown mass of spores, covered at first with a gray epidermis which later bursts and exposes the spores.

The finger-and-toe disease and its control, J. P. WAGNER (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 41, pp. 610, 611*).—A popular description of this common disease of cabbage, mustard, and related plants, together with recommendations for its control are given.

The bean anthracnose, C. W. EDGERTON (*Louisiana Stas. Bul. 119, pp. 3–55, pls. 14; abs. in Science, n. ser., 31 (1910), No. 802, p. 753*).—The results of two years' study on bean anthracnose (*Colletotrichum lindemuthianum*) under Louisiana conditions are given, including descriptions of the period of incubation, methods by which the organism survives the winter, and relation of the fungus to temperature, soil organisms, etc.

Under the best conditions of growth the period of incubation was found to be 4½ to 6 days.

The fungus survives the winter by means of mycelium in the seed and by spores. It is unable to live during the summer months in Louisiana on account of the high temperature. A mean temperature of 80° F. with the minimum above 70° seems to destroy it.

Various soil organisms, especially a species of Fusarium, were found to destroy much of the anthracnose by causing the rotting of the seed and the crowding out of the anthracnose organism itself.

As a result of inoculation experiments with spores of the bean anthracnose, slight infection was secured on pole beans and Lima beans, but none on peas, young cucumber plants or fruits, alfalfa, or cotton.

A bibliography is appended.

A new species of Endomyces, C. E. LEWIS (*Abs. in Science, n. ser., 31 (1910), No. 799, p. 638*).—The author briefly describes a new species of Endomyces found associated with an apple decay studied by him at the Maine Experiment Station.

Banana disease in Costa Rica (*Jour. Jamaica Agr. Soc., 14 (1910), No. 3, pp. 101, 102*).—Attention is called to the fact that the so-called banana disease (E. S. R., 22, p. 748) is due to grubs which attack the suckers at the bulb and eat their way through the heart to the top, while the little mole-like animals are responsible for only about 8 per cent of the losses.

It is further claimed that the largest proportion of deaths of banana plants is due to lack of drainage and to the soil being too long under bananas and heavily shaded, rather than to any specific organism.

Sooty mold of the olive, D. VIDAL (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 24, pp. 730, 731*).—A brief description is given of the sooty mold of olive trees, which is caused by a fungus following certain insects. The author recommends for its control spraying the trees with a 2 per cent Bordeaux mixture to which 1 liter of turpentine is added to every 100 liters of Bordeaux mixture. This should be sprayed upon the trees twice during the season, the first spraying when the eggs of the insect are deposited in the greatest number, and the second application about the first of September when the conditions of humidity and temperature favor the development of the fungus.

The downy mildew in 1908, H. FAES (*Terre Vaud., 1 (1909), No. 9, pp. 85–87*).—This is a discussion of the preparation of various sprays for combating the grape mildew and the results obtained from conducting a series of experiments in which the following sprays were used: Bordeaux mixture with 2 per cent copper sulphate, Bordeaux with 1 per cent copper sulphate, soda Bordeaux, soda Bordeaux and sulphur, oxychlorid of copper, sulphate of copper (1 per cent neutralized directly with 1 per cent of alkaline polysulphid), and Reflorit, a trade compound. Three applications were made of each at intervals of 15 days.

The 1 and 2 per cent Bordeaux mixtures had the same effect in controlling the mildew, as only a trace of the fungus could be found on the leaves, while the yields were 313.46 and 301.7 liters per plat, respectively. The oxychlorid of sulphur treatment was nearly as effective in controlling the fungus as the Bordeaux mixture, while the yield was 310.66 liters per plat. The sulphate of copper and alkaline polysulphid was decidedly inferior to these sprays, both in controlling the fungus and in the size of the yield, which was only 215.51 liters, while the Reflorit was poorest of all, as both the leaves and the fruit were attacked on the plats treated with this spray and the yield was only 194.14 liters.

Lathræa clandestina on the grapevine, P. MARSAIS (*Rev. Vit., 33 (1910). No. 844, pp. 169–176, pl. 1, figs. 9*).—In a previous article (E. S. R., 21, p. 345), the parasitism of *L. clandestina* on the grapevine is pointed out. The present author adds to the information regarding this pest, giving an account of its life history, parasitism, biology, and anatomy.

The biology of Plasmopara viticola, W. RUHLAND and F. C. VON FABER (*Mitt. K. Biol. Anst. Land u. Forstw., 1909, No. 8, pp. 19–21*).—The results of experiments on the germination, infection, and incubation periods of this fungus are given.

It was found that out of 51 inoculations of conidia on the upper surface of the leaf only one infection was produced, while of 48 inoculations on the lower leaf surface not less than 38 were effective. This would indicate that spraying the upper surface of the leaves in combating this disease is practically worthless.

The incubation period for the conidia, even under the most favorable conditions, was found to be at least 5 days and often ranged from 10 to 20 days.

The root rot of coffee in Guadeloupe, N. PATOUILLARD (*Jour. Agr. Trop., 10 (1910), No. 104, pp. 58, 59*).—A brief description is given of a root rot of coffee, which can be recognized by the appearance of a mat of mycelium on the surface of the roots, which also penetrates into the bark. Trees badly attacked show the taproot lacking rootlets, while in other cases the rootlets are decorticated to their extremities. In the absence of any fruiting bodies it is impossible to determine definitely the fungus causing this trouble, but it is believed to be a species of either Rosellinia or Dematophora. It has been found that in Guadeloupe the same fungus attacks trees used as shade and from them may spread to the coffee.

As a means for preventing the spread of this disease it is recommended that infected trees be dug up and their roots completely removed and burned in the hole from which they were dug. Care should be exercised to prevent too much moisture about trees. As the use of carbon bisulphid has given good results with the root rot of grapes, it is thought that probably this method of treatment would also be efficient.

Coniophora cerebella as a timber destroyer, E. SCHAFFNIT (*Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 10–12, pp. 352–356, pl. 1*).—Attention is called to the wood-destroying properties of this fungus, which like species of Merulius and Polyporus produces a form of dry rot in timber.

The appearance of Glœosporium fagicolum in Germany, H. MORSTATT (*Ann. Mycol., 7 (1909), No. 1, pp. 45–48, figs. 2*).—In a park near Geisenheim a leaf spot disease has appeared on the beeches each year with increasing severity. By midsummer the trees are entirely bare of leaves. The spots on the upper surface of the leaves are about 0.5 mm. in diameter, dark brown, with a light yellowish-green border next to the healthy tissue. Later in the center of the spots light gray irregular areas appear. As the spots die, they become a light grayish-brown and finally this dead tissue falls out, leaving yellowish-brown bordered holes, oval or irregular in shape. In this manner the entire leaf surface is finally destroyed.

On the lower surface of the leaves, the appearance of the spots differs but little from that on the upper surface. The brown color is a somewhat lighter shade, more of an olive green, and the light gray areas are slower in appearing.

The author has determined that the disease is due to *G. fagicolum* and a description is given of the microscopic characters of the fungus. An examination of beech trees from other portions of Germany indicates that *G. fagicolum* is more widely disseminated than hitherto supposed.

Two trunk diseases of the willow oak, H. VON SCHRENK (*Abs. in Science, n. ser., 31 (1910), No. 794, p. 437*).—A brief note is given on the attack of willow oak (*Quercus phellos*) by two polyporoid fungi.

A trunk disease of the osage orange, H. VON SCHRENK (*Abs. in Science, n. ser., 31 (1910), No. 794, p. 437*).—An account is given of a fungus disease occurring in the heartwood of living trees of the osage orange. Attention is called to the fact that this is the first case reported of a disease of this character, the osage orange having been considered practically immune from fungus diseases.

Controlling fungus diseases, J. B. S. NORTON and A. J. NORMAN (*Maryland Sta. Bul. 143, pp. 177–215, figs. 8*).—This bulletin gives an account of spraying experiments with lime sulphur and other fungicides, comparing their efficiency with that of Bordeaux mixture for the control of the diseases of orchard crops, such as peaches, apples, and plums. The tests made show that Bordeaux mixture is a better fungicide than any of the others, even though it may cause some injury to the apple fruit and can not be safely applied to tender plants, such as the peach. From the standpoint of safety the self-boiled lime sulphur is less liable to injure the plants than the others. Bordeaux mixture, however, proved most economical, as it gave the largest percentage of marketable fruit.

In the second part of the bulletin directions are given for the making and application of Bordeaux mixture and other fungicides and insecticides, followed by tabular statements regarding different diseases and the best fungicides and insecticides and dates for their application.

Investigation on the toxic action of Bordeaux mixture, J. B. DANDENO (*Rpt. Mich. Acad. Sci., 11 (1909), pp. 30–32*).—In continuation of previous investigations (E. S. R., 21, p. 340) the author has studied the effect of Bordeaux mixture on the seedlings of peas, corn, and lupines. Both the supernatant liquor of the Bordeaux and the Bordeaux mixture were tested and the effect on the growth of the radicles determined.

The investigations with the supernatant Bordeaux, limewater, and Bordeaux mixture showed that the Bordeaux mixture was 4 times as toxic as the supernatant liquid. Fresh Bordeaux mixture was found less toxic than that which had stood for a considerable time. As in the previous investigation, the author found that certain dilutions were more toxic than others, corn growing in a solution of supernatant liquid of one-fourth strength, while it would not grow in a one-eighth strength solution. This is explained by the statement that probably more rapid decomposition goes on in the dilute solutions.

The author deduces from his experiments the following conclusion: Bordeau mixture becomes more toxic as it becomes older, and consequently may cause damage that it would not do if used fresh.

The toxic action of copper sulphate on Botrytis cinerea, H. COLIN (*Rev. Gén. Bot., 21 (1909), No. 248, pp. 289–294, fig. 1*).—The results of a number of experiments are given on the toxic action of various strengths of copper sulphate solution on the germination of the spores and the subsequent growth of the mycelium of *B. cinerea* in glucose culture media. In conducting these experiments 10 series of 4 cultures each were prepared as follows: In each vessel was 250 cm. of nutritive liquid, containing at the beginning of the cultures 8 gm. of anhydrous glucose, to which was added 25, 37.5, 50, 62.5, 75, 125, 150, 250, 300, and 350 mg., respectively, of copper sulphate. The toxicity of each concentration represented was determined by the quantity of glucose remaining at the end of the experiment and by the decrease in weight of dried matter.

Concentrations ranging from 25 to 75 mg. of copper sulphate per 250 cc. of culture media showed no toxic action. Even at a concentration of 300 mg. there was an appreciable growth, but with 350 mg. growth practically ceased, although some mycelium was formed.

This toxic action is due to the copper, for when sulphates in the form of ammonium sulphate corresponding to 300 mg. of copper sulphate were used in the cultures, no deleterious effect was produced on the growth of the fungus.

The method of action of a new copper fungicide, G. PERRIN (*Bul. Soc. Nat. Agr. France, 69 (1909), No. 10, pp. 890–893*).—An account is given by G. Bonnier of investigations carried on with a soda-copper mixture to which a form of black soap was added. The effect of this fungicide on the conidia and zoospores of *Peronospora viticola* was especially studied.

The author found that while copper inhibited the germination of the spores, the presence of soap in the mixture caused both the conidia and the zoospores to swell and burst, thus destroying them. The mixture was found to be very efficient as a fungicide. By reason of the soap, which forms a very complex combination, it seems to be more efficient than the ordinary Bordeaux mixture. It is also more fluid, easier to apply, and more adherent. It not only destroys the zoospores but is found to penetrate the parenchyma of the leaf for some distance following the development of the mycelium, and the action of the copper destroys the mycelium within the leaf.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Progress of game protection in 1909, T. S. PALMER, H. OLDYS and C. E. BREWSTER (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 73, pp. 19, fig. 1*).—This brief review is a continuation of the series which has been prepared annually since 1902 in order to place on record a condensed statement of the more important events of each year, to indicate the progress in various lines and show what has been accomplished in protecting wild life, introducing new species, or increasing the game in public and private preserves.

Report of the entomologist, D. T. FULLAWAY (*Hawaii Sta. Rpt. 1909, pp. 17–46, figs. 8*).—This report consists of a brief general account of the occurrence of insect pests during the year and a synopsis of Hawaiian Aphididæ, of which 9 genera and 21 species have been recognized, 4 species being described as new to science.

Through the dipping and fumigation of pineapple suckers and the liberal application of tobacco dust to the plants, the mealy-bug (*Pseudococcus bromeliæ?*) and the scale-bug (*Diaspis bromeliæ*) were kept at a minimum.

The chief investigations of the year were those of the insects affecting cotton, a bulletin relating to which has been previously noted (E. S. R., 22, p. 58). Three species of cutworm, namely, the black cutworm, the army worm, and *Spodoptera mauritia* were particularly injurious to crops during the winter and spring. The army worm was found for the first time injuring rice, serious losses being reported from all the rice producing sections of the islands. At two places on Kauai, and at Kalihi, Punaluu, Hauula, and Kailua on Oahu, the damage amounted to from 10 to 60 per cent of the crop.

A tortricid moth (*Amorbia emigratella*) which attacks a great variety of soft and succulent plants, including citrus, alligator pear, guava, passion-flower vine, tomato, etc., is rapidly increasing and gives promise of becoming a serious pest of fruits. The introduction of parasites of bean weevils from Texas is said to be under way. Cultures of entomophagous fungi have been received from Florida and will be tried on destructive Coccidæ.

Caterpillars of two species of moth, *Cryptoblabes aliena* and *A. emigratella*, were found to prevent the natural formation of pods of the algeroba, on the beans of which stockmen depend largely for winter fodder.

Insect notes for 1909, O. A. Johannsen (*Maine Sta. Bul. 177, pp. 21–44, pls. 3*).—This bulletin contains brief accounts of the insects of greatest importance in Maine during the season of 1909.

The saddled prominent (*Heterocampa guttivitta*) though less injurious than the previous year was a source of considerable injury to the birch and other deciduous forest trees. Descriptions of the earlier stages are given of several of the species noted, including the spindle worm (*Achatodes zeæ*), birch leaf Bucculatrix (*B. canadensisella*), apple leaf sewer (*Ancylis* [*Phoxopteris*] *nubeculana*), a fungus gnat (*Mycetobia divergens*), two species of crane flies (*Ctenophora apicata* and *Trichocera regelationis*), a potato maggot (*Drosophila busckii*), and a beetle (*Carpophilus hemipterus*) found feeding on dried peaches.

Other insects the occurrence of which is noted are *Acrobasis rubrifasciella*, abundant on sweet fern, the fall webworm, gipsy and brown-tail moths, cigar case-bearer, lesser apple worm, the salt marsh caterpillar and *Diacrisia* (*Spilosoma*) *virginica* attacking garden crops, San José scale, cottony grass scale (*Eriopeltis festucæ*), grape leaf hopper, the downy physillid of alder (*Psylla floccosa*), several species of Aphididæ, the grass thrips (*Anaphothrips striata*), a false crane fly (*Rhyphus punctatus*), mosquitoes, the currant fruit fly, a tachinid fly (*Frontina archippivora*) parasitic on *Anosia plexippus*, the bumble flower beetle (*Euphoria inda*) which attacked apples in storage, a scolytid beetle (*Pityophthorus coniperda*) which mines in pine cones, shot borer (*Xyleborus dispar*), pine borer (*Monohammus scutellatus*), and the spruce (*Lophyrus abietis*) and larch (*Nematus erichsonii*) saw flies.

Insects of field crops, R. H. Pettit (*Michigan Sta. Bul. 258, pp. 35–84, figs. 51*).—This bulletin is the third of a series dealing with the insects affecting different classes of crops, of which the first and second have been previously noted (E. S. R., 15, p. 1089; 17, p. 990). Under crop headings summarized accounts are given of the more important pests of field beans, clover, corn, oats, field peas, timothy, and wheat.

Report of the department of vegetable pathology, W. T. Horne (*Estac. Cent. Agron. [Cuba] Rpt. (English Ed.), 2 (1905–1909), pt. 1, pp. 72–90, pls. 4*).—This report includes a brief account of cane insects, tobacco insects, citrus insects, and insects affecting leguminous crops.

First report of the state entomologist upon the horticultural inspection work for the year 1909 (*Ann. Rpt. Bd. Hort. Colo., 1909, pp. 115–137, pls. 2*).—Twelve counties in the State are reported to have horticultural inspectors.

Orchard and nursery inspection law, approved April 19, 1909, together with the rules and regulations of the commissioner of agriculture relating thereto, E. R. KONE (*Texas Dept. Agr. Circ. 1, n. ser., pp. 11*).—An excerpt of this law.

Some insect galls of Cuba, M. T. COOK (*Estac. Cent. Agron. [Cuba] Rpt. (Spanish Ed.), 1 (1904–5), pp. 247–252; (English Ed.), 2 (1905–1909), pt. 2, pp. 143–146, pls. 9*).—Of the 15 forms of galls described in the first paper, 10 are formed by species of Eriophyes and 5 by species of Cecidomyia. Descriptions are presented in the second paper of galls formed by 5 species of Eriophyes, of 7 formed by species of Cecidomyia, and 3 by species of Cynips.

Notes on Termes gestroi and other species of termites found on rubber estates in the Federated Malay States, H. C. PRATT (*Dept. Agr. Fed. Malay States Bul. 1, pp. 12*).—Previously noted from another source (E. S. R., 20, p. 764).

A catalogue of the Orthoptera of Cuba and the Isle of Pines, J. A. G. REHN (*Estac. Cent. Agron. [Cuba] Rpt. (English Ed.), 2 (1905–1909), pt. 2, pp. 175–226*).—An annotated list in which 195 species are considered. Of these, 69 are peculiar to Cuba and 25 to tropical and subtropical America, 24 are Antillean in distribution, 23 occur in South America and the Antilles, 14 occur in North America and Cuba only, and 10 are circumtropical.

Some new Thysanoptera from southern California, I, D. L. CRAWFORD (*Pomona Jour. Ent., 1 (1909), No. 4, pp. 100–108, figs. 4*).—A genus (Ankothrips), 3 species, and 2 varieties are described as new to science.

Notes on California Thysanoptera, I (*Pomona Jour. Ent., 1 (1909), No. 4, pp. 120, 121*).—Notes are given on the occurrence of *Euthrips tritici*, *Thrips tabaci*, *T. madronii*, *Heliothrips fasciatus*, and *Leptothrips aspersus*.

Some Thysanoptera of Mexico and the South, I, D. L. CRAWFORD (*Pomona Jour. Ent., 1 (1909), No. 4, pp. 109–119, figs. 4*).—The genus Rhaptothrips, 3 species and 1 variety from near Guadalajara, Mexico, and 1 species from Managua, Nicaragua, are described as new to science.

The apple leaf-hopper, R. L. WEBSTER (*Iowa Sta. Bul. 111, pp. 5–32, figs. 14*).—During the season of 1909 apple leaf-hoppers were particularly abundant in Iowa nurseries, their attack resulting in the stunting of a large number of trees.

The young hoppers are especially common on nursery stock four times during the season, viz, the latter part of May, June, July, and August, when the different generations appear. The work of the insect becomes evident through a peculiar curling of the growing tops of nursery stock, particularly of the apple stock during the month of June. "The result of an attack of the leaf-hoppers is that the growth of the new wood is shortened, the leaves grow close together on the branches, and the whole tree fails to attain the size it should in a season's growth. Consequently many nursery trees do not become the proper size in three years and frequently they must be left for another year to complete their growth."

The winter is passed both in the egg and in the adult stages. So far as known the winter eggs are placed only in the bark of apple trees, while during the summer they are deposited in a large number of food plants in the petiole or in the larger veins of the leaves. Although the period required for the incubation of the egg has not been determined, it is shown to be at least 6 days or longer in August. In 1909 the first young were observed on May 13. Insectary records have shown considerable variance in the time lengths of the 5 nymphal stages, technical descriptions of which are presented. About a month is required for the completion of the life cycle from egg to adult. In

Iowa there are four generations, counting the generation which hatches from the egg early in the spring as the first. Leaf hoppers are found on foliage as late as the middle of October, although most of them are gone by that time.

Triphleps insidiosus, which attacks the nymphs, is said to be the most important natural enemy. Occasionally larvæ of the lace-winged flies attack the hoppers. A mite nymph has been found attached to the thorax of an adult hopper and an empid fly (*Drapetis* sp.) has been observed with its proboscis inserted in the under side of the abdomen of nymphs.

"Experiments during 1909 showed that the dipping of nursery stock in simple soap solutions was effective in killing practically all of the leaf-hoppers on the trees dipped. For southern Iowa the best time for this dipping is about June 20 and July 20; for central Iowa, the 25th; and for northern Iowa, the 30th. The June treatment is the more important one. Trees might also be treated about the same time in August. . . . Solutions of whale-oil soap and white laundry soap were found to be very successful as dips. The first was used 1 lb. to 8 gal. of water, and the second 1 bar (about 10 oz.) to 8 gal. To be effective this dipping must be thoroughly done, and well timed, so as to catch the insects when they are most susceptible." "Spraying with kerosene emulsion for the first generation of leaf-hoppers, which work on the lower leaves of the nursery trees, was fairly effective. The spraying for the second generation was not so effective, on account of the badly curled terminal leaves at that time. Other materials were also used, but with similar results. . . .

"It has been suggested that the hoppers might be attracted to light and caught in lantern traps. Observations made at Ames show that this attraction is not great enough so that it could be used in this way."

A bibliography of the literature relating to this species is appended.

Chermes of Maine conifers, EDITH M. PATCH (*Maine Sta. Bul. 173, pp. 277–308, pls. 14*).—Seven species of Chermes, 6 of which are gall forming, are here described and figured. A discussion of the economic aspects of the two more important species has been previously noted (E. S. R., 22, p. 552).

The pine leaf Chermes, *C. pinifoliæ* (=*C. abieticolens*), was found in great abundance at Orono on June 16, at which time most of the individuals were dead with a large cluster of eggs beneath the wings. On July 5 at Milo, dead individuals were very abundant on the needles of white pine, as many as 16 adhering to a single needle. By June 21 fresh Chermes were present on the needles of white pine everywhere in the neighborhood of Orono. The disappearance of the emerging *abieticolens* from the spruces coincided exactly in time with the appearance of *pinifoliæ* on the white pine. On June 22, galls from the black spruce were placed in a cage with fresh twigs of various conifers. Three days later more than 200 individuals were found to have settled and deposited eggs on the white pine. On July 3, young were observed to be hatching out in conspicuous numbers. These young of the migrants settled at the tips of new pine twigs, where by the latter part of July their presence was very conspicuous on account of the white waxy secretion, which gives a woolly appearance to the infested portion. Where the infestation is heavy, it causes a yellowish, sickly appearance of the new growth, which is considerably stunted. *C. pinifoliæ* found on spruces the middle of May are thought to be the return migrants from pine, although the actual migration has not been observed. The data here presented indicate that either the time which *pinifoliæ* spends on the spruces is very short, 4 to 6 weeks, or that a 2-year cycle is required. A bibliography accompanies the account of this species.

C. abietis has been abundant annually on the Norway and white spruces at Orono. The life cycle based upon the author's observations is as follows: "Galls open about mid-August and fully grown pupæ emerge and molt within

a few hours, becoming the winged form which deposits a cluster of 40 to 50 yellow eggs on a spruce needle. The eggs are extruded from the abdomen but the parent Chermes remains over them until dislodged after her death by wind or rain. The winged form often oviposits near the gall from which it emerges. A different species of host plant is never sought by this Chermes. In about 2 weeks the young 'stem mothers' hatch from these eggs and seek a protecting crevice in the surface of the spruce bud where they can spend the winter. These wingless forms develop in the spring and become full grown about the last of May when they lay a cluster of 140 or more eggs. From these eggs hatch the young that inhabit the gall and are known as the 'gall generation' with which we started the cycle."

Migrants of *C. laricatus*, a species which forms galls upon white spruce, resembling those of *abietis* in size and form, were found July 31 to be common on the needles of larch at Orono. In an experiment in which opening galls were placed upon sprigs of a number of conifers, the species showed a decided preference for the larch.

C. consolidatus galls, collected from black spruce, began to open July 30. The opening galls were placed in a cage on twigs of several species of conifers, and several days later eggs were found to have been laid very sparingly on each of 4 spruces and on the balsam fir. On June 20, Chermes pupæ were found developing at the base of larch cones in flocculent matter.

C. floccus develops in galls on black and red spruce and migrates to the needles of white pine to oviposit. At Orono winged forms migrate to pine from the middle to the last of July. In the woods these migrants were found abundant on white pine needles over clusters of about 40 eggs. In a laboratory test made July 19, it showed a decided preference for white pine, although several settled and deposited egg clusters on white spruce.

C. similis forms galls on Norway, white, red, and black spruce. Galls of this species were the only ones in which apterous oviparous forms were found.

C. pinicorticis infests the trunks of white pine in Maine, covering them more or less with a white secretion, which gives the bark a moldy appearance. The infestation was particularly heavy during 1908 and 1909, but during the latter season many syrphus maggots were present and these seem likely to check its increase.

Technical descriptions of stages of the species and of the galls accompany the accounts and a key for the separation of the several species is appended.

Chermes of Maine spruces, EDITH M. PATCH (*Psyche, 16 (1909), No. 6, pp. 136, 137*).—Notes are given on the 6 species of gall-forming Chermes above noted.

Aphididæ of southern California, III, E. O. ESSIG (*Pomona Jour. Ent., 1 (1909), No. 4, pp. 98, 99, fig. 1*).—Descriptions are given of the winged viviparous and apterous viviparous females and of the nymph of the apterous viviparous female of *Chaitophorus populicola*, which is found in considerable numbers on the young stems of *Populus trichocarpa* in the Santa Clara River Valley near Santa Paula.

Combating the citrus mealy bug, E. O. ESSIG (*Pomona Jour. Ent., 1 (1909), No. 4, pp. 89–91*).—An account is given of experiments with different strengths of hydrocyanic-acid gas, which, up to the present time, has not given satisfactory results. The insect enemies of the pest, including *Cryptolæmus montrouzieri*, *Rhizobius ventralis*, and the brown lace-wing, are said to be doing effective work.

Some miscellaneous results of the work of the Bureau of Entomology, IX. The woolly white-fly: A new enemy of the Florida orange, E. A. BACK (*U. S. Dept. Agr., Bur. Ent. Bul. 64, pt. 8, pp. 65–71, pl. 1, figs. 4*).—In this

paper the author presents an account of the life history and habits and technical descriptions of the woolly white-fly (*Aleyrodes howardi*), which as previously noted (E. S. R., 22, pp. 254, 752) has been found to have become established at Tampa, Fla. It occurs on several islands in the West Indies, including Porto Rico and Cuba, where it appears to be partially held in check by parasites and predaceous enemies. In Florida it has become well established over a large portion of the city of Tampa and eastward about two miles into Ybor City.

The last brood of adults of this species has been found to be on the wing later in the year than that of either the citrus or spotted-wing white-fly, at Tampa adults having been noted by the author late in January. "Unless molested or crowded each female deposits her eggs in a complete circle, she being always on the inside. This arrangement she effects by using her mouth parts as a pivot upon which to rotate her body. Since often as many as 3 or 4 rows of eggs are present in one circle, it is evident that the female describes several circles while ovipositing before seeking a new place. Although as few as 27 eggs have been counted in a single circle and as many as 130 in a circle of 4 rows, it is probable that the larger number does not indicate the maximum egg-laying capacity, which in the case of *A. citri*, has been found to be 222."

The larva after hatching crawls about before settling. Soon after ceasing to crawl it develops a short inconspicuous marginal wax fringe similar to that of the first instar of *A. nubifera*. During the second instar 6 white, abdominal cross bands and a distinct white marginal fringe of wax develop. Each of the dorsal spines also secretes a long outstanding waxen rod. "After passing into the third instar the larva, except in point of size, assumes the appearance of the pupa; the marginal fringe and abdominal secretions found in the preceding instar remain practically the same, but these are largely or wholly concealed by the long white, curling, and variously matted secretions which arise from along, but not on, the margin of the insect, giving to a leaf infested with this species a woolly appearance, which, when infestation is heavy, entirely conceals the insect beneath. These threadlike secretions are often twice as long as the insect itself. . . . The adult insect of either sex is lemon-yellow, with pure-white wings, without darker markings; the ground color of the body being partially obscured by loose particles of waxen secretions. The adult resembles closely *A. citri*, the citrus white-fly, but carries its wings farther away from the body, thus leaving more of the abdomen exposed."

A globule of honeydew which collects over the vasiform orifice, often becoming so large as to conceal the posterior half of the body, is said to be characteristic of this species. "These globules are extremely viscid and make the handling of leaves infested with this aleyrodid very disagreeable. They collect in large numbers in the waxen secretions on heavily infested leaves and both they and the secretions become grayish and dust-laden with age. The globules frequently become overgrown by a rank growth of greenish-brown fungus resembling the hyperparasitics species attacking the yellow white-fly fungus, *Aschersonia flavocitrina*."

The woolly white-fly has been found to infest the various species of citrus, the guava, and the mango, but the author considers its presence on the mango as probably the result of accident. The red fungus (*A. aleyrodis*) has been reported to attack this species in Cuba. "From present indications it seems probable that this white-fly will be more easily controlled by fumigation than by spraying, inasmuch as when nearly mature it is very well protected from spray liquids by the secretions, mentioned above. Present indications are that during the early larval instars it is as well controlled by spraying as are the citrus and the spotted-wing white-flies, with which it is found associated."

Notes on California Coccidæ, E. O. Essig (*Pomona Jour. Ent., 1 (1909), No. 4, pp. 92–97, figs. 7*).—Notes are given on *Parlatoria pergandii, Ceroplastes ceriferus, Chionaspis quercus*, and *Ceroputo yuccæ*.

Spraying for the codling moth, W. E. Rumsey (*West Virginia Sta. Bul. 127, pp. 127–140, pls. 2, fig. 1*).—The author presents a short preliminary report of a comparative test made during 1909 of the so-called eastern and western methods of applying arsenicals for the codling moth, as based on spraying experiments conducted in Berkeley County on 16-year-old Ben Davis trees. Trees treated by the eastern method were sprayed on May 13 with Bordeaux mixture (3–5–50 formula) to which was added 3 lbs. of lead arsenate to each 50 gal. of liquid, double vermorel nozzles with a pressure of 100 lbs. being used in the application. A similar application was made May 28. The third spraying was done on June 16, and the fourth and last on July 22. "The trees used in the western method of treatment were sprayed on the afternoon of May 12, 1909 (calyx in the same condition as with the other method) using 1 lb. of arsenate of lead to 50 gal. of water, with a Bordeaux nozzle attached to the extension rod at an angle of 45° and the pressure gage on the gasoline sprayer registering from 200 to 250 lbs." The results obtained from each method and the infestation of fruit on unsprayed trees are reported in tabular form, the number of worms entering from the calyx, stem, and side being indicated.

While the data as summarized in the following table appear to show that there was practically no difference in the results obtained, it is thought that further tests are necessary to determine definitely which is of the most value in time and money to the grower.

Percentage of infestation of apples by codling moth on sprayed and unsprayed trees.

Fruit.	Western method.		Eastern method.		Unsprayed trees.	
	Number examined.	Per cent wormy.	Number examined.	Per cent wormy.	Number examined.	Per cent wormy.
Dropped after June 23	3,044	2.2	2,419	4.3	4,955	29.6
Picked	12,015	2.8	6,326	2.9	5,247	38.3
Total	15,059	2.6	8,745	3.3	10,202	34.1

A great excess of calyx wormy fruit, both picked and dropped, from the eastern or mist sprayed trees over that of the western or coarse-high pressure spraying was noted. The percentage of side and stem wormy apples was apparently much greater with the western method.

"In using a coarse nozzle it was found that about twice as much material was applied as in the case of the mist spray; therefore, the amount of arsenate of lead in the material for the two methods would be in the relation of 2:3, although but 1 lb. of the poison to 50 gal. of water was used in the western method and 3 lbs. in the eastern." More time was consumed in spraying by the western method because of the necessity of taking special care to fill the calyx cups, but since in the eastern methods several additional sprayings are necessary, it is concluded that if the western method will always give the good results obtained in this test, much time can be saved to eastern orchardists through its adoption.

In this test records were also kept of the injury caused by the plum curculio. It was found that where the one coarse-high-pressure spray was used 12.5 per cent of the fruit was stung, and where the 4 mist sprays were applied 13.9 per

cent of the apples were injured, while the unsprayed trees gave 32.1 per cent of punctured fruit.

In conclusion it is stated that as a result of proper spraying to reduce injury from insects and diseases, a profit of $6,000 was obtained from a 13-acre grove of 13-year old apple trees in Berkeley County.

An injury to pine trees in Cuba, caused by Dioryctria sp. and other Lepidoptera, W. T. HORNE and J. S. HOUSER (*Estac. Cent. Agron. [Cuba] Rpt. (English Ed.), 2 (1905–1909), pt. 2, pp. 147–149*).—Serious injury to the pine trees near Herradura in del Rio province is reported. In November, 1907, nearly all of the pine trees appeared to have been affected at some time during their development, through having the central or terminal shoot killed. In some cases the central shoot was converted into a tapering rod 6 ft. or more in length which died and was attacked by wood-boring insects. After the death of the central shoot or leader one of the lateral branches grows out and becomes a leader, or several may grow out in this way. These secondary leaders may be attacked successively, making the trunk so crooked that the tree has little value.

The tobacco split worm, J. S. HOUSER (*Estac. Cent. Agron. [Cuba] Rpt. (English Ed.), 2 (1905–1909), pt. 2, pp. 133–139, pl. 1*).—In Cuba, attention was first directed to injury by *Phthorimœa operculella* in April, 1907. It appears to be widely distributed in the island. At San Juan and Martinez, it was learned that the insect had been present in the district extending from that place west to the sea for at least 25 years, the pest being known locally as Candelilla. "The plants upon which this insect has been observed feeding in Cuba are tobacco, eggplant, pendejera (*Solanum torvum*), *Solanum verbascifolium*, *Solanum* sp. (probably *S. jamaicense*), and the common jimson weed (*Datura* sp.), the list being arranged with regard to the susceptibility to attack."

The wattle processionary caterpillar, W. E. JONES (*Natal Agr. Jour., 13 (1909), No. 6, pp. 745–750*).—Observations on the life history and habits of this species are reported.

Three parasites (2 tachinids and an ichneumon fly), and a predaceous bug keep the pest from doing any great amount of injury. The predaceous bug, a reduviid, which forms in adjacent colonies of from 12 to 20 individuals, arrives in ones and twos and remains near the caterpillars. This bug is said to be a remorseless exterminator of the cluster to which it is first attracted, remaining as it does until the colony of caterpillars is entirely destroyed.

The relation of sex to heliotropism in the brown-tail moth, W. REIFF (*Psyche, 16 (1909), No. 6, pp. 115–118*).—A contribution from the entomological laboratory of the Bussey Institution.

Heredity of the race characters univoltinism and bivoltism in the silkworm (Bombyx mori), ISABEL MCCRACKEN (*Jour. Expt. Zool., 7 (1909), No. 4, pp. 747–764*).—An account is given of a series of breeding experiments which extended through a period of 5 years. "It seems that as between these intraspecific characters, there is an underlying 'law of potency' that has to do with characters as ancestral rather than with characters as parental units."

Blood sucking insects of Madagascar, J. SURCOUF (*Insects Piqueurs de Madagascar. Tabanides. Paris, 1909, pp. 44, pl. 1; rev. in Bul. Inst. Pasteur, 7 (1909), No. 23, p. 1013*).—This is the first part of a systematic study of the Madagascan Tabanidæ. Two genera (Methoria and Bouvierella) belonging to the subfamily Pangoninæ are described as new.

Fly-borne enteric fever: The source of infection, N. FAICHNIE (*Jour. Roy. Army Med. Corps, 13 (1909), No. 5, pp. 580–584*).—The author concludes that "infection conveyed by flies' legs, natural though it may appear from all the

experiments carried out to prove its possibility, is not a common, nor even a considerable cause of enteric fever, in time of peace at any rate. On the other hand, infection by the excrement of flies bred in infected material explains many conclusions formerly difficult to accept. In a word, it is the breeding ground that constitutes the danger, not the ground where the flies feed."

The rat flea (Ceratophyllus fasciatus) attacks man, J. C. GAUTHIER and A. RAYBAUD (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 37, pp. 859, 860*).—Experiments are reported which show that this species sucks human blood. Thus it may play a rôle in the transmission of bubonic plague and possibly other infectious diseases.

Snout beetles that injure nuts, F. E. BROOKS (*West Virginia Sta. Bul. 128, pp. 145–185, pls. 6, figs. 10*).—This bulletin reports the results of an investigation made at French Creek, W. Va., that extended over a period of several years. Special efforts were made to acquire information regarding the egg-laying habits of the different species, their life histories, seasonal abundance, natural enemies, and methods of reducing or preventing loss.

With the exception of the beechnut all the 27 species of nuts found in West Virginia are attacked by the larvæ of one or more of the 14 different species of snout beetles here considered. "Young walnuts and hickorynuts are frequently attacked soon after the blossoms fall from the trees and the infested nuts drop to the ground before they are half grown. Chestnuts, acorns, and some other varieties sustain the greatest injury as they approach maturity. It is not unusual for chestnuts that are kept a week or two after gathering to become from 50 to 75 per cent wormy and acorns often suffer to even a greater extent. The infested nuts are rendered unfit for food and in many cases are so badly eaten that they will not germinate when planted."

The normal life cycle in West Virginia for all the species here discussed is described as follows: "Beetles issue from the earth in July and August, several weeks after blossoms have disappeared from nut trees, practically all the individuals of one species leaving the ground at near the same time. Egg-laying continues from the time the meat in the nut begins to form until the nut is full-grown. Eggs hatch in from one to two weeks. Larvæ feed on the kernel of nuts, some species reaching full growth before or near the time the nuts drop and others maturing much later. Full-grown larvæ leave the nuts through large, circular holes which they eat in the shell. The larva, after leaving a nut . . . penetrates the soil for an inch or more where it fashions a small cell . . . in which it passes the winter unchanged. In June, July, and August the larvæ change to pupæ in which stage they remain for two weeks, more or less, and then transform to adults. They remain in their cells as adults for several days, or, often, until a warm rain softens the earth, and then emerge and go to the trees." There are some exceptions to this rule, however, as occasionally individuals of at least 2 species, the chestnut weevil and the confused acorn weevil, will change from larvæ to adults, either late in the fall or early in the spring, and issue from the ground in May. "Another departure from the normal life cycle is the case of a small percentage of larvæ which remain for two years in their cells in the earth and then transform to beetles and issue from the ground in company with those that develop from the previous season's generation of larvæ."

The larger chestnut weevil (*Balaninus proboscideus*), the largest of the nut weevils, is one of the most abundant and destructive species. It attacks chestnuts and chinquapins, laying most of its eggs early in the season so that by the time the ripe nuts drop from the trees the full-grown larvæ are abundant in the nuts.

The chestnut weevil (*B. rectus*) deposits most of its eggs a short time previous to the dropping of the nuts from the trees. The shellbark is the only native hickory that is attacked extensively by the hickorynut weevil (*B. caryæ*) in West Virginia, and this variety is seldom injured more than 20 per cent. Other varieties, such as the pignut and mockernut are often destroyed to the extent of 50 to 75 per cent of the crop. Injury by the hazelnut weevil (*B. obtusus*) varies from 5 per cent to one-half the crop. The common acorn weevil (*B. quercus*) is the largest of the weevils attacking acorns. The mottled acorn weevil (*B. nasicus*) was found to be the least common of all the acorn infesting weevils, while the straight snout acorn weevil (*B. orthorynchus*) has been restricted to biennial oaks. The sooty acorn weevil (*B. baculi*), the confused acorn weevil (*B. confusor*), and the spotted acorn weevil (*B. pardalus*) are also considered.

Two species of curculio attack walnuts and hickorynuts, often causing a heavy drop of the immature nuts. These are the walnut curculio (*Conotrachelus juglandis*) and the hickory curculio (*C. affinis*). Two acorn curculios, the larger acorn curculio (*C. naso*) and the smaller acorn curculio (*C. posticatus*) are also considered.

A bracon parasite (*Urosigalphus armatus*) is one of the most important insect enemies of these beetles. A smaller bracon parasite, known as *Sigalphus curculionis* was reared in abundance from the larvæ of the hickorynut curculio and in lesser numbers from those of the walnut curculio. Other natural enemies mentioned are three species of ants (*Lasius aliena*, *Aphænogaster aquia*, and *Solenopsis debilis*), 2 parasitic flies (*Metadexia basalis* and *Myophasia ænea*), the larva of a click-beetle, and the nymph of *Podisus maculiventris*. The short tailed shrew is considered as perhaps the most important enemy.

While these pests are difficult to deal with, it is said that very satisfactory results are being obtained by a few persons who are producing and handling nuts on a large scale. Remedial measures mentioned are fumigation of the nuts with carbon bisulphid, destruction of infested nuts, cultivation of the soil about nut trees, and trapping the beetles by hanging twigs covered with dead leaves to the branches and on the body of the tree about the time the beetles are most abundant.

Some insects injurious to truck crops. The life history and control of the hop flea-beetle, W. B. Parker (*U. S. Dept. Agr., Bur. Ent. Bul. 82, pt. 4, pp. 33–58, pls. 2, figs. 10*).—This is a report of investigations of the hop flea-beetle (*Psylliodes punctulata*), conducted in British Columbia during 1909. A general account of this pest including the results of investigations made by H. J. Quayle in 1908 have been previously noted (E. S. R., 21, p. 154).

As beetles confined in cylinders oviposit from 1½ to 2 in. below the surface of the soil and eggs were also found in the field about 1½ in. below the surface, it is concluded that this is about the average position in which they are deposited. Eggs buried in moist soil in the laboratory and in the hopyard hatched in from 19 to 22 days. The length of the larval life was found to be about 35 days. "This insect does not form a distinct pupal cell, as is the case with some other coleopterous larvæ, but when full-grown ceases to feed, contracts greatly in length, and enters a long somnus, the prepupal stage. The larva remains in this stage from 11 to 14 days, and then transforms to a true pupa with free appendages."

The true pupal stage lasts on the average 16½ days. "After the adult has emerged from the pupal state, between 12 and 24 hours are required for coloring and, perhaps, as much longer for it to work its way out of the soil. Beetles which appeared to be not over 4 days old were found in copula and,

judging from these very unsatisfactory data, about 6 days would be required for the beetles to become fully mature. . . . When ready to oviposit, the female works her way down into the soil until she reaches the moist layer, where she lays her quota of eggs. . . . Beetles captured in copula and confined in vials laid from 4 to 18 eggs."

The longevity of the beetle is said to be quite variable, several lots of newly emerged insects dying within a week, while an individual from a lot collected May 11 lived until August 22. From 3 to 6 weeks is thought to be the average. Any soil with a moderate moisture content appears to be favorable for the growth of the larvæ, the texture having no influence whatever upon them.

The species has been observed feeding upon a large number of plants. Laboratory experiments showed a difference in the food plants preferred by beetles captured on hops and those collected from mangels. "During the spring and early summer the beetles fed upon the shoots and tender buds and ate holes the size of a pin head in the leaves. . . . In feeding upon the hop plants, the beetles dug small pits in the shoots, which when the attack was severe caused the death of the stem. In the fall the beetles climb the trellis poles and crawl along the vines until they reach the hop cones, of which they are very fond. When the beetles appear in large numbers they will devour a plant completely."

There are two distinct broods of beetles in the Chilliwack and Agassiz valleys. One emerges in the early spring and the other in the latter part of July or the first part of August. About 84 days is said to be required for the completion of the life cycle. Hibernation commences with the arrival of cold weather, the beetles crawling into the first favorable place that is found. In 1909 the first beetles observed emerged March 9. The maximum number, however, did not appear until April 15.

Beetles collected between June 10 and 14 are said to have been killed in large numbers by a bacterial disease. "The larva of one of the Carabidæ was quite plentiful in the soil, and under laboratory conditions was observed to feed voraciously upon the flea-beetle larvæ. Two species of centipedes were also numerous, but only one was observed feeding upon the larvæ.

Control measures are considered under the headings of tarred board or sticky shield, tarred sledges, banding with tanglefoot, destruction of hibernating beetles, Bordeaux mixture, Bordeaux-tobacco extract, tobacco dust, impractical measures, spraying, traps, and cultivation and fertilization. These measures were tested during the spring and summer, the application of tanglefoot and under some conditions the use of the sticky shield proving to be the key to the flea-beetle problem. At the time the vines are ready to train, the beetles may be greatly reduced in numbers so that the vines can reach the strings by the use of the sticky shield or the heavier tarred board. "After the vines are trained the beetles are readily controlled by the use of tanglefoot bands. These bands should be renewed on the vines, and the trellis poles should also be banded at the time that the vines are tied in and stripped, or just before the appearance of the second generation. These tanglefoot bands form a perfect barrier to the insects. Even though the beetles are present in very large numbers they can not reach the upper parts of the hop vines, which can therefore produce a crop without molestation. In order to starve the beetles the yards should be well cultivated and all suckers cut from the bases of the vines. If this is done the emerging insects will find very little to feed upon. In some cases the destruction of the beetles which hibernate in the trellis poles, string pegs, and vine stubs may be advisable, but if the banding is thoroughly done and the yards are kept clean during the growing season, very few beetles will live through the winter to attack the vines in the following spring."

Revision of the Coccinellidæ of Madagascar, A. SICARD (*Ann. Soc. Ent. France, 78 (1909), No. 2, pp. 135–165, figs. 25*).—This is a continuation of the revision previously noted (E. S. R., 22, p. 362).

Supplement to the list of Coleoptera of Guadeloupe, M. PIC (*Ann. Soc. Ent. France, 78 (1909), No. 2, pp. 166–172*).—A third supplement to the list of Guadeloupe Coleoptera published by Fleutiaux and Sallé in 1889.

Monograph of the wasps of the genus Belonogaster, R. DU BUYSSON (*Ann. Soc. Ent. France, 78 (1909), No. 2, pp. 199–270, pls. 6*).—A table for the separation of species accompanies the monograph.

Two common orchard mites: The brown mite, the red spider, G. P. WELDON (*Colorado Sta. Bul. 152, pp. 3–12, figs 7; Better Fruit, 4 (1910), No. 10, pp. 21–26, figs. 7*).—The brown mite (*Bryobia pratensis*) and the red spider (*Tetranychus bimaculatus*) were quite generally distributed in the orchards of the western slope of Colorado during 1909, their injury in some localities being quite severe.

The brown mite passes the winter in Colorado principally in the egg stage. These overwintering eggs are deposited during May, June, and July. In 1909, but few living mites could be found after August 1. The eggs are usually deposited on the trunk and limbs of trees, the crotches being favorite places. The author has found the eggs more numerous on pear, cherry, plum, prune, and almond than on any other orchard trees. The apricot and quince do not seem to be attacked. The eggs hatch with the warm weather of spring, the young being abundant on May 1 at Delta in 1909. In the larval stage they are red in color, but after the first molt become brownish or often an olive-green color. Observations made during 1909 indicate that in western Colorado there are but 3 broods.

Their direct injury is confined principally to the foliage, but masses have frequently been observed upon the stems. "The epidermis of a leaf is pierced by their mandibles and the sap sucked from within. The first sign of infestation of a tree is the pale color of the leaves, not unlike that caused by leaf-hoppers; when not abundant there may be only a few leaves affected. They generally attack the lower leaves first, and unless conditions are favorable to their increase, they may confine themselves largely to the water sprouts and tender twigs at the crotch of the tree. When multiplication is uninterrupted they may cover the foliage of an entire tree causing it to turn yellow and drop prematurely, thereby materially weakening the vitality of the tree. Little black specks, the droppings of the mites, render the fruit and foliage unsightly, and while there may be no serious consequences from this source, it probably does sometimes interfere with the looks of a fancy pack of early fruit. Often the fruit of a badly infested tree is small and does not mature properly."

Experiments with tobacco sprays indicate that while they kill the mites touched, repeated applications during the summer are necessary to keep the pest in check, as the eggs are not destroyed and many mites escape the spray. Experiments show that flowers of sulphur, 1 lb. to 3 gal. of water with enough soap so that the sulphur will mix with the water is a perfectly effective remedy when used as a summer spray. Oil sprays seem to penetrate the eggs and destroy them better than the tobacco extracts, but are unsafe to use with water strongly impregnated with alkali. Lime-sulphur applied when the trees are dormant has no effect upon the eggs, but appears to kill the young mites as they hatch out.

T. bimaculatus is the only red spider of importance in western Colorado. Its injury is similar to that of the brown mite. In many cases small fruits have been damaged severely; raspberry, currant, and gooseberry bushes are thought to have been the greatest sufferers. The leaves are sapped of their vitality,

turn yellow and drop early, while the fruit is small often not maturing sufficiently to be salable. The mite passes the winter in the ground, within 10 ft. of the base of the affected trees, and usually near to the trunk. The eggs are deposited chiefly on the under surface of the leaves. In 1909, hibernation began as early as August 9, myriads of the mites being found in the ground at Palisade on that date.

The lace-winged flies and a small black species of lady beetle (*Scymnus punctum*) are mentioned as natural enemies.

The sulphur spray as mentioned for the brown mite is recommended for use in combating this pest in summer.

Arachnida of Cuba, N. BANKS (*Estac. Cent. Agron. [Cuba] Rpt. (English Ed.), 2 (1905–1909), pt. 2, pp 150–174, pl. 1*).—In this paper 100 species are recorded from Cuba and 10 others have previously been recorded from the island. Of these species 16 are described as new, 5 of the new forms being among the daddy-long-legs. The author believes that 200 or 300 species will be found in the Island.

Fumigation scheduling, C. W. WOODWORTH (*California Sta. Circ. 50, pp. 24, figs. 14, charts 3*).—The author first discusses the development of methods for determining the tented space as required in the fumigation of citrus fruit trees. If the tent or tree is calculated as a regular figure, the volume may be reckoned from any combination of any two of its four dimensions except the circumference and diameter. All of these dimensions may be determined optically from the ground except the circumference, and all of them can be measured directly.

The author refers briefly to direct measurements, which may be made by pacing, by the use of a pole, or by a tape. The distance over the tree is considered to be best secured by graduating the tent and making it in effect a tape.

Optical methods are based upon the comparison of similar triangles and depend upon the fact that the sides of such triangles are exactly proportional to each other. Four methods are suggested as available for optical measurement. These consist in the application of the principle of the photo camera, the magic lantern, displacement mirrors, and direct vision.

Two methods of direct vision are recommended for use, one, more accurate for experimental work, the other very rapid for practical fumigation. The first or so-called accurate method depends upon the use of a tape to measure the distance from the tree to the scheduler. The apparatus used consists of a sighting diagram, and a specially graduated tape reading in ounces. A different diagram is required for each different basis of calculation. "The process of measuring a tree when done by one person consists in attaching one end of the tape to the nearest point on a tree or tent, then backing off until the width of the tree just fills the diagram. If the top of the tree also corresponds, the graduation on the tape indicates the ounces that should be used. A series of marks on the diagram indicates the amount to add or subtract for high or low trees." The most convenient means of holding the chart at a constant distance from the eye is by the use of a light wire around the hat band, the end of the wire being bent into a hook against which the chart will rest when making an observation.

The apparatus used in the second or so-called rapid method consists of an arrangement for holding at a constant distance from the face a loop or steel wire, which can be so bent as to conform with the shape of the tree, being adjustable both for height and width. In order to obtain uniform readings with this instrument, it is necessary to hold the chart at a constant distance from the eye as with the so-called accurate method, and one must also stand at a uniform distance from the tree to be measured. In the two methods of measurement described, a difference in dosage is provided for in the adjust-

ments of the instruments and a difference in the basis of calculation by using different tapes or charts.

Attention is called to the fact that leakage is a prime factor in determining the relative amount of cyanid to use in tents of different size and that there may be other important factors, such as absorption of gas by the plant, to be considered. The area basis in which a 20 ft. tree receives 4 times the dose of a 10 ft. tree, which was first suggested by the California Station is thought to be as safe a basis to adopt as any until our knowledge of the matter is further advanced. The linear basis in which a 20 ft. tree receives twice as much as a 10 ft. tree is, however, made use of by a majority of the fumigators in California.

Descriptions of the methods of calculation, graphic calculation, use of the chart for calculating direct measurements, heights and breadth, distance over and around the tent, and directions for graduating tapes, etc., follow. The circular concludes with an account of adjustments and the errors to be guarded against in the two methods.

Preparation and use of concentrated lime-sulphur, J. P. STEWART (*Pennsylvania Sta. Bul. 99, pp. 3–15, figs. 3*).—This bulletin deals in a popular way with the details relating to the preparation, preservation, and use of concentrated lime-sulphur solution.

Insecticides, H. J. QUAYLE (*California Sta. Circ. 49, pp. 2*).—This circular gives formulas for 15 of the more important insecticides and directions for their use.

FOODS—HUMAN NUTRITION.

Report upon food (In *Third Report of Committee on Physiological Effects of Food, Training, and Clothing on the Soldier. London: Gt. Brit. War Off., 1908, pp. 2–14; Jour. Roy. Army Med. Corps, 12 (1909), No. 6, pp. 669–681; abs. in Brit. Med. Jour., 1909, No. 2533, pp. 162, 163; Lancet [London], 1909, II, No. 3, pp. 157–159*).—In this article, theories of nutrition, food requirements, and related questions are discussed and experiments and observations summarized with reference to the quality, nature, and variety of food required by the soldier during peace and during war, messing arrangements, the composition of tinned meats, and the influence of preservatives.

The nutrients and energy in the ration allowance of 4 regiments were calculated, maximum, minimum, and average values being reported. The average protein ranged from 131 gm. per day with the infantry depot regiment to 142 gm. with the English infantry regiment, and the energy values from 3,248 calories with the Scotch infantry to 3,478 calories with the cavalry. Considering the general averages for the 4 regiments, the ration allowance supplied 133 gm. protein, 115 gm. fat, and 424 gm. carbohydrates, the energy value being 3,369 calories.

For purposes of comparison data are quoted regarding British soldiers in detention, the Royal Navy, the boys in the Royal Navy, and seamen of the Royal Navy, and other figures regarding army and civilian diets.

"Compared with Atwater's standard it [the average peace ration] is less than the dietary of a man doing moderate work; and it seems probable that by itself it would not be sufficient except at times when the work of the soldier is rather slack. This dietary is, however, nearly always supplemented by food bought for supper at the canteen or elsewhere; and the pay of all soldiers is now sufficient to enable this to be done without hardship. The amount thus bought probably brings the average energy value of the food up to fully 4,000 calories."

"The committee concluded from their inquiries that the recruit usually requires more food than the fully trained soldier; for many of the newly enlisted are rapidly growing lads, and often after a period of unemployment before enlistment require good feeding to enable them to perform their duties in an efficient manner. This conclusion is supported by the fact that they buy considerable quantities of cakes, etc. . . .

"It is a common mistake to suppose that, on an average, men eat more or less food according as they can afford it. The main determining factor is undoubtedly the amount of physical work they perform, and the soldier is no exception to this rule. If he is worked hard he must have more food, and in times of extra exertion certainly requires on an average more than 4,000 calories, to prevent gradual loss of strength and efficiency.

"As the result of their inquiries, the committee believe that, taking into account the extra food which the British soldier is now well able to buy when he requires it, he receives, during peace, sufficient food: and as far as could be judged from visits to Aldershot, Tidworth, Cardiff, Halifax, Newcastle-on-Tyne, Hounslow, and Reading, and the examination of the different articles given in the messing accounts, the quality and variety of food are satisfactory."

It is stated that the committee has not thoroughly studied the question of war rations, but the data summarized regarding the minimum ration allowance of the British Army in South Africa show that it supplied 138 gm. protein, 105 gm. fat, 528 gm. carbohydrates, and 3,903 calories.

"For men constantly engaged in marching and fighting a ration amounting to . . . about 4,500 calories would be needed, to judge from available data. The amount of physical work done during war varies considerably, however, and possibly the British war ration, which has apparently been fixed as the result of considerable practical experience, would prove sufficient. On this point further observations of a more definite character than those at present available are, we think, needed."

Among the recommendations of the committee regarding the preparation and inspection of canned meat, the following are quoted:

"The amount of fat in tinned meat should be 10 to 15 per cent."

"There should be a definite relation between the weight of a tin and the weight of its contents, irrespective of whether the weight of the latter is 'nominal' or 'actual.'

"The present practice of dating the tins should be continued; . . . the tins should be painted, not lacquered, and . . . no paper labels should be allowed.

"Sample tins should be examined after they have been incubated for a fortnight at 37° C."

Report on an analysis of tinned meats as supplied to the army, W. W. O. Beveridge (*In Third Report of Committee on Physiological Effects of Food, Training, and Clothing on the Soldier. London: Gt. Brit. War Off., 1908, pp. 15–48; abs. in Jour. Roy. Army Med. Corps, 13 (1909), No. 1, pp. 82–94, fig. 1*).—An examination was made of a number of samples of tinned meat designed for army use, the composition and the amount of nitrates and heavy metals present being determined as well as the general character of the goods. In age the samples ranged from 1 month to 5 years and 7 months, and included roast beef and mutton and corned beef and mutton.

Report on further analysis of tinned meats, W. W. O. Beveridge (*In Third Report of Committee on Physiological Effects of Food, Training, and Clothing on the Soldier. London: Gt. Brit. War Off., 1908, pp. 52–56; Jour. Roy. Army Med. Corps, 13 (1909), No 3, pp. 325, 326*).—Twelve samples of canned roast beef, 7 samples of canned roast mutton, and 9 samples of canned corned mutton were analyzed and the maximum, minimum, and average figures reported.

A report on the further analysis of compressed corned beef as supplied at the present time to the army, W. W. O. BEVERIDGE (*In Third Report of Committee on Physiological Effects of Food, Training, and Clothing on the Soldier. London: Gt. Brit. War Off., 1908, p. 48*).—A sample of compressed cooked corned beef was examined. Determinations were made of the proximate constituents and the different nitrogenous constituents. The fat was especially studied, the usual constants being determined.

Bacteriological report, C. E. P. FOWLER (*In Third Report of Committee on Physiological Effects of Food, Training, and Clothing on the Soldier. London: Gt. Brit. War Off., 1908, pp. 49–51; Jour. Roy. Army Med. Corps, 13 (1909), No. 3, pp. 323–325*).—In connection with the work reported above, bacteriological studies were made of 5 samples of canned meat, 3 of the cans being "blown." From one of them an organism was isolated having the characteristics of *Bacillus putrificus coli.* "It must have been present in the meat before packing, resisted the process of sterilization, and survived with very slow growth under the strictly anaerobic conditions present.

"The vitality of these spores is considerable, as they will resist boiling for one or two minutes."

The same organism had probably been present in one of the other cans examined, according to the author, having "survived for a certain time and then died out."

[Experiments on canning meat], W. W. O. BEVERIDGE and H. B. FAWCUS (*In Third Report of Committee on Physiological Effects of Food, Training, and Clothing on the Soldier. London: Gt. Brit. War Off., 1908, pp. 57–72, dgm. 1*).—Two papers are included in this report.

In the first paper are given the results of studies as to the penetration of heat into the substance of the meat in tins during sterilization. A thermometer was inserted into the interior of cans of meat which were heated under conditions approximating those followed in processing canned goods. From a consideration of the recorded experimental data, the authors point out that "when tins of meat of identical size and shape are immersed in fluid boiling at a certain temperature, there is considerable variation in the length of time required for the center of the meat to reach a given temperature. The cause of this is somewhat uncertain. Each experiment was carried out in an identical manner, so that the cause must have been in the tins themselves. It is probable that the rate of penetration of the heat is influenced by the amount of fat present in the meat. The percentage amount of this is found to vary considerably in different tins. The fact of the meat being tightly or loosely packed, and the condition of the vacuum present, may also favor or retard the penetration of the heat."

In the second of the two papers included in this report the thermal death point and the optimum temperature of growth were studied of the bacillus isolated from blown tins of corned meat referred to above which is apparently identical with *Bacillus cadaveris sporogenes* of Klein and *B. putrificus coli* of Bienstock. The general conclusions drawn from the investigation follow:

[*B. cadaveris sporogenes*], although found nonpathogenic to animals, decomposes tinned meats and renders them quite unfit for consumption. Therefore processes of sterilization of tins of meat must be used which will destroy the spores of this bacillus.

"The optimum temperature of growth of this bacillus is blood heat (37° C.).

"At this temperature inoculated tins of meat become rapidly decomposed, but this decomposition is not necessarily made apparent at once by the presence of gas in the tin. Blowing of the tins often does not take place within a fortnight, even at this temperature. Tins of meat contaminated with the spores of

this bacillus could be kept at temperatures of 22° and under for many months, without showing any signs of blowing. If, however, such contaminated tins, although apparently sound when examined in this country, were exposed to a temperature such as is likely to be met with in the Tropics, they would rapidly become decomposed."

"To ensure complete sterilization, the temperature of the medium surrounding the tins, must always be above 112°. The lowest temperature of the surrounding fluid which will completely sterilize the tins, within a reasonable time, is 120°, and this temperature must act for not less than 60 minutes.

"From the two experiments recorded with a fluid boiling at 130°, it would appear that even then at least an hour would be required to ensure the death of these very resistant spores. We are aware that the above results do not tally with the usually accepted idea of the thermal death point of spore-bearing bacilli, but we would point out that experiments have not before, to our knowledge, been made with this particular bacillus.

"The experiments were carried out with every available precaution against error and repeated often enough to ensure accuracy."

Report on the nature and causes of the blackening of the interior of tins, W. W. O. Beveridge (In *Third Report of Committee on Physiological Effects of Food, Training, and Clothing on the Soldier. London: Gt. Brit. War Off., 1908, pp. 73–79; Jour. Roy. Army Med. Corps, 13 (1909), No. 3, pp. 326–332*).—Experimental studies were made with a view to determining the cause of the discoloration of the interior surface of tin cans, particularly those containing meat.

According to the author, "the discoloration of the interior of tins containing moist foods, which have been sterilized by heat, varies from a mere brown stain here and there to complete blackening, and, in certain cases, actual erosion of the metal.

"The discoloration is insoluble in water, alcohol and ether, and is not volatized by heat. It is soluble in mineral acids, and to a large extent by alkalis, such as sodium hydroxid. In many cases some of the greasy discoloration will be found to be soluble in ether, paraffin, or glycerol. From chemical analysis the blackening may be said to be due to: (1) Sulphid of tin; (2) sulphid of iron; (3) oleate of iron."

From his investigations he concludes that "except in cases where the contents of the tin are blackened by contact, or where there is actual erosion of the metal, the discoloration of the tin is probably not in any way deleterious to the consumer, nor has it any injurious effect upon the food itself.

"Except in the case of bacterial fermentation, a high temperature, above 110° C., appears to be essential.

"In putrid samples of tinned meats, blackening and erosion of the metal can easily be accounted for by bacterial fermentation, caused by anaerobic spore-bearing bacilli, which forms large quantities of H_2S mercaptan bodies and acids, these reacting on the tin form sulphids of the metals.

"Perfectly fresh meats having an acid reaction may be sterilized at even a high temperature (120 to 130° C.) without causing blackening of the tin.

"Where alkalinity of the food exists, from being tainted or from having become so during the pickling process, and where the heat of sterilization is carried too far, much blackening of the interior is liable to result.

"Acidity of the contents, except where it exists in a high degree, does not cause the same amount of discoloration as in the case of foods having an alkaline reaction.

"Excess of fat, combined with a high degree of heat in the presence of superheated steam, is responsible for a certain amount of discoloration.

"Much blackening of the interior of tins of meat might be regarded as indicating, in some instances, that the food was not in a perfectly fresh condition before sterilization, and that the manufacturers in consequence employed higher temperatures during sterilization than ordinarily used, with a view to insuring efficient sterility."

The manufacture of food products, J. E. RICHELET (*Bol. Min. Agr. [Buenos Aires], 11 (1909), No. 7, pp. 657–686*).—The manufacture of different sorts of canned goods, the preservation of meats, the use of preservatives, and similar questions are considered.

The milling and baking qualities of Indian wheats. II, Some new Pusa selections tested in 1909, A. and G. L. C. HOWARD (*Agr. Research Inst. Pusa [India] Bul. 17, pp. 24*).—The report includes data on the composition and bread making qualities of a number of varieties of Indian wheats, and discusses the wheat industry of India and the importance of producing improved varieties.

The effect on the market prices of establishing definite grades is also considered.

Flour and bread making, R. HARCOURT and MISS M. A. PURDY (*Ontario Dept. Agr. Bul. 180, pp. 40, figs. 9*).—In this discussion of flour and bread making the results obtained at the Ontario Agricultural College are summarized as well as other data. Circumstances influencing the quality of wheat, the milling and quality of flour, leavening materials, chemical changes which take place in bread making, composition of bread made from different kinds of flour, and similar topics are discussed, and recipes are given for making bread and pastry.

Mycoderma infection of baker's yeast, W. HENNEBERG and M. P. NEUMANN (*Ztschr. Spiritusindus., 33 (1910), No. 2, pp. 13, 14; abs. in Chem. Ztg., 34 (1910), No. 25, Repert., p. 101*).—Numerous biological analyses of press yeast showed that 50 to 80 per cent of the yeast consisted of *Mycoderma cerevisiæ* species. From the experiments made it is concluded that such a mixture of wild and cultivated species can not be employed for making bread.

The chemical composition of figs, R. PALADINO (*Biochem. Ztschr., 24 (1910), No. 3–5, pp. 263–265*).—The author reports the composition of fresh figs (*Ficus carica*), both flesh and skin, and of dried figs.

Nonalcoholic beverages, G. AMBÜHL (*Jahresber. Kantonschem. St. Gallen, 1908, p. 21; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 6, pp. 349, 350*).—Data are given regarding the composition of a so-called milk champagne made from sweetened and flavored skim milk and a beverage made from the material remaining after wine distillation.

Flavoring extract of vanilla, A. McGILL (*Lab. Inland Rev. Dept. Canada Bul. 201, pp. 9*).—This report is based on the examination of 77 samples, purchased throughout Canada. In the absence of a legal standard for vanilla flavoring extract in Canada, the author does not think that opinions regarding the samples can be expressed.

Food inspection decisions (*U. S. Dept. Agr., Food Insp. Decisions 119, p. 1; 120, p. 2*).—These two decisions have to do, respectively, with the use of shellac and other gums for coating chocolates and other confections and with the labeling of Ohio and Missouri wines.

The board is of the opinion that the practice of coating chocolates and other confections with shellac and other gums is not a proper procedure under the provisions of the Food and Drugs Act, since such coating will not only conceal inferiority but as a rule the gums are dissolved in alcohol some of which must necessarily permeate the product. "Evidence further shows that one of the reasons for adding the coating is that the goods may be held for a longer time.

The exposure of confections for a long while before use is not advisable nor desirable."

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 269, pp. 2; 270–271, pp. 5 each; 272, pp. 2; 273–274, p. 1 each; 275, pp. 2; 276–277, p. 1 each; 278–279, pp. 2 each; 280, pp. 3; 281–282, p. 1 each; 283, pp. 3; 284, pp. 7; 286, pp. 2; 288, p. 1; 289, pp. 2; 290, p. 1*).—These notices of judgment have to do with the adulteration of sardines and desiccated egg; the misbranding of maple sirup, salt, a drug product, coffee, vinegar, cane and maple sirup, and honey, and the alleged misbranding of danderine; and the adulteration and misbranding of maple sirup, vinegar, black pepper, lemon flavor, lemon powder and orangeade powder, powdered milk, and molasses.

Studies of protein metabolism in children, P. GROSSER (*Biochem. Ztschr., 24 (1910), No. 3–5, pp. 346–353*).—An infant 7 months old and a 4-year-old child were subjects of the experiments reported. The author concludes that in the case of children the nitrogen metabolism is not affected by the amount of water taken and that the metabolism of nitrogen may be regarded as representing protein metabolism when the experimental period is sufficiently long and the results not deduced from too limited observations.

Experimental studies of the effects of temperature upon the digestive power of gastric and pancreatic juice, H. ROEDER (*Biochem. Ztschr., 24 (1910), No. 6, pp. 496–520, dgms. 2*).—From his experimental studies the author concludes that the digestive power of pepsin and trypsin has a direct relation to temperature, increasing to a temperature of over 40° C., the optimum being 50 to 55° rather than 40° as has been previously claimed. Pepsin, trypsin, and ptyalin exposed to very low temperatures, i. e., liquid air, lost their digestive power.

The author also considers the temperature relations of human gastric juice in comparison with that of a dog.

The protecting effect of colloids in the digestion of casein and fat of milk, J. ALEXANDER (*Ztschr. Chem. u. Indus. Kolloide, 6 (1910), No. 4, pp. 197–201*).—The author has summarized and discussed a considerable amount of data supplementing the article previously noted (E. S. R., 23, p. 12).

[Beriberi in the Japanese army] and hygiene concerning food and drink, W. C. BRAISTED (*In Report on the Japanese Naval Medical and Sanitary Features of the Russo-Japanese War to the Surgeon-General, U. S. Navy. Washington: Govt., 1906, pp. 43, 44, 77, 78*).—The relation between beriberi or kakke and the eating of large quantities of rice is discussed and data summarized showing the disappearance of beriberi after the improvement in the army and navy ration, particularly with reference to the use of larger amounts of protein. The report, which was the result of a personal study of the subject in Japan, also contains a large amount of data regarding sanitary and other topics of special interest from the standpoint of medicine.

Notes on rations of different armies in peace and war, W. G. MACPHERSON (In *Third Report of Committee on Physiological Effects of Food, Training, and Clothing on the Soldier. London: Gt. Brit. War Off., 1908, pp. 82–101*).—A compilation of data regarding rations of the French, German, United States, Japanese, Spanish, and Italian armies. In a number of cases the nutrients and energy in the ration have been calculated by Pembrey.

Some analytical data are also reported.

Composition of emergency rations, W. W. O. BEVERIDGE (In *Third Report of Committee on Physiological Effects of Food, Training, and Clothing on the Soldier. London: Gt. Brit. War Off., 1908, pp. 80, 81*).—Analyses are reported of 3 samples each of two sorts of emergency rations.

Report upon clothing and equipment, A. Keogh et al. (In *Fourth Report of Committee on Physiological Effects of Food, Training, and Clothing on the Soldier. London: Gt. Brit. War Off., 1908, pp. 3–10; Jour. Roy. Army Med. Corps, 13 (1909), No. 5, pp. 592–603*).—In this article the results of a number of tests are reported of the effects of the new and the old army equipment. Loss of moisture, increase in weight of the clothing, body temperature, pulse rate, and similar factors were studied with men on the march. The investigation as a whole has to do with the effects of clothing and other equipment upon these factors.

Second report (on the physiological effects of marching) of committee on physiological effects of food, training, and clothing on the soldier, A. Keogh et al. (*London: Gt. Brit. War Off., 1908, pp. 21*).—The effect of clothing of different kinds, external temperature, and other factors were studied with reference to muscular work, i. e. marching.

Interim report (on the physical training of recruits) of committee on physiological effects of food, training, and clothing on the soldier, A. Keogh et al. (*London: Gt. Brit. War Off., 1908, pp. 11*).—The old and new methods of army training are discussed with reference to physical efficiency and related questions.

ANIMAL PRODUCTION.

Studies with Sudan III in metabolism and inheritance, O. Riddle (*Jour. Expt. Zool., 8 (1910), No. 2, pp. 163–184*).—The author has here summarized previous results obtained in feeding Sudan III and reported further experiments.

Laying hens were fed Sudan III in gelatin capsules, dissolved in egg yolk, butter, or animal fat, and by enclosing small lumps of the stain in pieces of bread. The results were very similar in all cases. The stain was introduced into the bodies of chicks and rabbits by feeding and by injection of its solution in a mixture of oleic acid and alcohol. A widely variable quantity of the solution was injected into the peritoneal cavities of these animals; also into brachial veins of the chick, and ear veins of the rabbit. In feeding turtles the stain was made into capsules with butter and placed in the stomach by means of forceps.

With the fowls and rabbits the stain was deposited in the growing ova. Fowls heavily fed on Sudan III, for even a day or two, usually showed a reddish color in all their adipose tissues, but most prominently in subcutaneous and peritoneal fat. When the stain was fed to newly hatched chicks the feathers took up the stain and became distinctly red in color. Only traces of the stain were found in the somatic tissues of turtles. Rabbits ingested Sudan III more slowly than fowls, but upon continuous feeding red-colored fat became visible in all parts of their bodies. "While in the body, Sudan III clings at all times to the fats or their constituent fatty acids, and so goes quite mechanically wherever these particles go; it is indeed, attached to them."

"The stained fat may appear in the mesenteric lymphatics as soon as 70 minutes after feeding. Perceptible amounts may be deposited on the periphery of growing ova one or two hours later. . . . Fat stained with Sudan is apparently less available to the organism than is unstained fat. . . .

"The significance in inheritance of our experience with Sudan lies: (1) In the fact that here we get—through relatively accurate knowledge of the properties and physiological behavior of this anilin dye—a clear picture of how particles of the food or soma become a part of the germ or new generation; (2) in the emphasis which it lays upon the fact that the normal constituents of the egg have a comparable history; (3) in the seemingly perfect parallel

which it offers in explanation of the inheritance of immunity, etc.; (4) and the possible light which this extremely simple form of inheritance may throw upon the mass of developmental and inheritance phenomena which seem to be of a much higher order of complexity."

A bibliography of the subject is appended.

Coloration of the milk in lactating animals and staining of the growing adipose tissue in the suckling young, S. H. and SUSAN P. GAGE (*Anat. Rec., 3 (1909), No. 4, pp. 203, 204*).—A continuation of earlier work (E. S. R., 20, p. 1170).

The adipose tissue of half-grown white rats showed a pink coloration within 5 days from the time the stain Sudan III was given in the feed. Contrary to expectations, newly born young of rats and guinea pigs did not show traces of the stain that had been mixed with the mother's food during gestation, which is proof that it did not pass through the placenta. At the end of 8 days after birth young rats showed an abundance of pink adipose tissue and the milk filling the stomach was so pink that it showed through the stomach wall.

[Studies on the development and the pigmentation of feathers], O. RIDDLE (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 12 (1907), No. 3, pp. 165–174, figs. 3; 14 (1908), Nos. 3, pp. 163–176, figs. 2; 6, pp. 328–370, pls. 4, figs. 5*).—These studies relate chiefly to the development of the feather, the structural differences between pigmented and nonpigmented areas of feathers, and the causes of pigment distribution.

The different types or defects in the structure of the adult expanded feather are thought to be due to a reduced nutrition caused by a daily lowering of the blood pressure. The rate of growth varies greatly in different feather tracts of the bird. "In a Plymouth Rock it was, in the primaries, secondary coverts and body coverts, 4, 2.25, 1.75 mm. daily respectively. In general, the rate bears a rather definite relation to the ultimate length of the feather; and is less at the proximal than at the distal end of the feather. . . .

"The ring dove shows a still more rapid feather growth. Seven mm. of growth in 24 hours has occasionally been recorded in the rectrices of these birds. The average for these birds is, rectrices 5 to 6 mm., primaries 5 to 6 mm., upper tail coverts 4 mm., primary coverts 4 mm. It will be recalled that this is also the order of frequency for the appearance of the defective areas in the various feather-tracts. This and kindred observations establish beyond doubt that the frequency of appearance of obvious fault-bars in feathers is directly related—one might say proportional to the rate of growth."

"Under starving conditions the rate of linear feather growth is not affected until the third or fourth day; after this the rate falls rapidly (doves). Fault-bars can be readily produced experimentally by reduced feeding: by the feeding of the fat stain Sudan III, which seems to 'tie up' certain foods; by very strong mechanical crumpling sufficient to break the tissues and blood vessels; and by lowering the blood pressure with amyl nitrite. . . . Previous results showing that the lowest (daily) temperature of birds occurs in the early hours of the morning (1 to 5 a. m.) have been confirmed. . . . The fundamental bars furnish the starting point for all evolutionary studies on the color-characters of birds."

Further contributions to the theory of heredidty, W. WEINBERG (*Arch. Rassen u. Gesell. Biol., 7 (1910), No. 1, pp. 35–49*).—A discussion of the Galton-Pearson ancestral law (E. S. R., 21, p. 771).

The author contends that biometrics has been overvalued by its advocates. It is, nevertheless, a valuable means of supplementing, though it can not supplant, breeding experiments and individual analysis in the study of heredity. It is further stated that the real point at issue between the biomerticians and

Mendelists is not the law of dominance but an insufficient consideration of the influence of environment upon the developing organism. The rule of dominance tends to lower the correlation between offspring and ancestor, while food, climate, exposure to disease, and other environmental factors tend to increase the ancestral correlation in the study of characters such as growth and body size, and may even outweigh the opposite tendency of the law of dominance if they are not excluded. Mathematical formulas are used tó demonstrate these and other arguments of the author on ancestral correlation.

The effect of selection upon Mendelian characters manifested in one sex only, W. E. Castle (*Jour. Expt. Zool., 8 (1910), No. 2, pp. 185–192*).—The author discusses the criteria by which Mendelian inheritance can be distinguished from non-Mendelian. Applying these criteria to results obtained in experiments with silk moths, univoltinism is deemed to be a Mendelian dominant to bivoltinism, although Miss McCracken (see page 260) views these characters as non-Mendelian.

Inheritance of the color of the seed coat of maize is used to illustrate the persistency of Mendelian character when manifested only in the female line, even when repeatedly excluded by selection, making it unnecessary to assume a "mysterious pull of ancestry," "delayed conjugation," or other hypothesis.

Atavism, M. Hilzheimer (*Ztschr. Induktive Abstam. u. Vererbungslehre, 3 (1910), No. 3, pp. 201–214, figs. 4*).—The author thinks that the poll character in cattle is a mutation and not a reversion, because no fossil hornless ancestor of the ox has yet been found, and because the poll character appears also in the yak, buffalo, sheep, and goat. It is improbable that all of these species had hornless ancestors and that horns should have developed in the same manner in all cases. In a discussion of atavisim, or reversion, it is stated that true reversion occurs in pigeons, mice, rabbits, guinea pigs, and other animals having a monophyletic origin, but seldom in dogs, goats, sheep, cattle, and others of a polyphyletic origin.

[A note on hybrid ducks] (*Proc. Zool. Soc. London, 1909, III, pp. 598, 599*).—A hybrid obtained by crossing 4 different species of ducks was to all outward appearances indistinguishable from the pure-bred wild mallard, a striking example of the truth of Mendel's law. Hybrids obtained from 5 different species proved fertile up to the fourth generation, since the last cross with a pure species.

Contributions to the study of the Equidæ. I, The differentiation of the three species of zebras. II, On hitherto unrecorded specimens of Equus quagga. III, On a portion of a fossil jaw of one of the Equidæ, W. Ridgeway (*Proc. Zool. Soc. London, 1909, III, pp. 547–588, figs. 42*).—A number of skins of zebras and quaggas are illustrated and described. The author concludes that the same species may vary in coloration according to the locality, and that apparently the quaggas of Orange River and Cape Colony were not specifically different from the Burchelline zebras. A fossil jaw from the late tertiary deposits of East Africa is apparently a new species, *Equus hollisi*, and an ancestor of one of the zebras.

Ages of sires and speed transmission, P. I. Miner (*Breeder's Gaz., 57 (1910), No. 17, p. 1030, chart 1*).—The author presents a table and chart which show the frequency distribution of over 1,300 individuals, the get of 18 sires, tabulated with respect to age of sire and the speed of the offspring.

Three individuals which made a record of 2:14 and 3 which made a record of 2:30 were foaled when the sires were 3 years old. Twelve-year old stallions produced progeny from 2:30 down to 2:06. The 2:18 records were made by offspring produced by sires of all ages, from 3 up to at least 25 years. The mean speed of the get varied but little, being with the 3-year old stallions

2:22, and with the sires between 10 and 11 years of age, 2:21. After that there was a gradual diminution, until at 20 years of age the sires produced a get with a mean speed of about 2:23½. The mean speed of the get was, therefore, about 2:22, dropping but slightly with the advanced age of the sire.

"A study of the table and of the graphic representation of the means points to the conclusion that there is a very slight correlation between the advanced age of the sire and a reduced speed record in the offspring. This correlation is, however, so small that it can not support an argument in favor of the young sire, and hence we can safely say that the age of the sire, in trotting-bred horses, exerts no practical influence upon the transmission of speed to the offspring."

Investigations on the influences that affect the length of pregnancy of domesticated animals, P. SABATINI (*Untersuchungen uber die Tragezeit bei Unseren Wichtigsten Haustieren. Inaug. Diss., Univ. Jena, 1908, pp. 107*).—This has been previously noted from another source (E. S. R., 20, p. 1170).

[Function of the interstitial cells of the testis], R. H. WHITEHEAD (*Anat. Rec., 2 (1908), No. 5, pp. 177–181; 3 (1909), No. 4, p. 264*).—The study of an abdominal and a scrotal testis of a horse, of a scrotal testis of a mule, and of a hermaphrodite horse supports the view of Ancel and Bouin that the manifestation of sexual instinct in the male mammals is due to a secretion of the interstitial cells. In all cases spermatozoa were absent, but the interstitial cells were abundant and consisted of normal cells with granules and of lipochrome cells.

The ligaments of the oviduct of the domestic fowl, MAYNIE R. CURTIS (*Maine Sta. Bul. 176, pp. 20, pls. 4, figs. 5*).—This bulletin describes the oviduct of the fowl and its development, and presents the results of a detailed anatomical study of the ligaments.

It is shown that the ligaments of the oviduct possess a definite and well developed musculature, which is continuous with the outer muscular layer of the oviduct. The dorsal and ventral ligaments undergo a progressive change in shape and size as the oviduct enlarges in preparation for functional activity. The mutual relations of the abdominal viscera are such as virtually to form a pocket in which the ovary lies. This walling off of the ovary is of such character as to tend mechanically to direct detached ova to the mouth of the oviduct.

"When a laying period is approached the growing yolks on the ovary crowd the viscera caudad. The intestine and cecum are forced backward and downward from the ovary. The mesentery of the intestine, the intestine itself, the peritoneum joining the left cecum of the intestine, and the left cecum itself, form a partition between the ovary and the other viscera. This partition is incomplete dorsal to the end of the left cecum and lateral to the anterior end of the rectum. This space is at the caudolateral angle of the ovary and here the mouth of the funnel is spread out facing that organ. It is thus in the position most advantageous to receive the mature yolks."

How many eggs can a hen lay? Mrs. HANDRIK (*Ztschr. Landw. Kammer Schlesien, 14 (1910), No. 15, pp. 451–453*).—The annual egg yields of 3 different hens are reported, one hen laying 473 eggs in 3 years, another 661 eggs in 4 years, and a third 1,034 eggs in 8 years. At the end of these periods the hens were killed, so that it is not known exactly how many eggs they were capable of laying.

Comparative weights of beef cattle, J. A. S. WATSON and E. HARRISON (*Breeder's Gaz., 57 (1910), No. 18, pp. 1072, 1073*).—The average age, weights, and gains per day in the different classes of pure bred beef cattle, shown at the International Live Stock Expositions for 1907, 1908, and 1909, are presented in tabular form.

The average weight of aged bulls was as follows: Shorthorn 2,297 lbs., Hereford 2,222 lbs., Angus 1,963 lbs., and Galloway 1,868 lbs.; of aged cows, Shorthorn 1,820 lbs., Hereford 1,691 lbs., Angus 1,541 lbs., and Galloway 1,426 lbs.; of 2-year-old steers, Shorthorn 1,617 lbs., Hereford 1,639 lbs., Angus 1,571 lbs., and Galloway 1,437 lbs. Rating the Shorthorn figures at 100, the relative weight of the other breeding stock was Hereford 96.2, Angus 89.9, and Galloway 82.9.

The following conclusions are drawn: "In general, animals of the beef breeds kept in high show condition reach half their final weight at something over 400 days or about 13½ months. They reach 75 per cent of their final weight at an age of something over 750 days or about 25½ months. Females approach their final weight somewhat faster than do males but the greater weight of the male is attained by greater daily gains being longer sustained than in the case of the female. In comparing the rate of growth in weight in the different breeds it will be seen that the Angus approaches its full weight more rapidly than does the Shorthorn. This is true in both sexes. The Hereford figures correspond closely to those of the Shorthorn in males and to those of the Angus in females; in other words, the earlier maturity of the female as compared with the male would appear to be accentuated in this breed. The numbers of Galloways are small and the ages do not in general correspond closely to those of the other breeds, so that the figures shown are less trustworthy. Contrary to expectation they show that the Galloway approaches its full weight faster than the Shorthorn and probably faster than the Hereford."

On comparing these figures with the weights of show steers at the Smithfield Show it was found that the English steers were considerably heavier. This was due in part to the tendency of the British feeders and breeders to show none but the choicest animals and in part to a difference in showyard ideals.

Carrying range steers through the winter. Sugar beets for fattening steers, W. L. Carlyle and G. E. Morton (*Colorado Sta. Bul. 149, pp. 3–15, figs. 2*).—Grade Hereford steers fed only during the third winter made an average gain of 235 lbs. per head during this time. The average weight when finished was 1,146 lbs. each, and they were valued at \$5.75 per hundredweight. Those fed the second and third winters gained 361 lbs. per head the third winter, weighed 1,407 lbs., and were valued at \$6.20 per hundredweight. Steers fed all 3 winters gained 223 lbs. per head the third winter, weighed 1,368 lbs. per head, and were valued at \$6.10 per hundredweight.

Apparently when the aim in view was to finish the steers as 2-year-olds the feed given to them as calves was wasted, but feeding them during the winter they were yearlings put them in shape to make better gains the next winter. The winter feeding of calves hastened the steers to maturity and consequently lessened their power for gain each successive season. With equal gains the calves put on their gain much more cheaply than yearlings, and the yearlings made their gain at about two-thirds the cost of the gain made by the 2-year-olds. "It seems more economical to winter feed as calves and finish as yearlings than to winter feed as yearlings and finish as 2-year-olds." In a steer fed only one winter there was slightly more bone and lean meat in the rib roast than in a steer fed 2 winters.

In a feeding trial of 16 weeks a ration of corn and alfalfa hay produced an average gain of 216 lbs. per head, at a cost of 6.23 cts. per pound. When half of the corn ration was replaced by sugar beets the gains averaged 239 lbs. per head, at a cost of 6.33 cts. per pound. Corn was rated at 1 ct. per pound, beets \$5 per ton, and hay \$5 per ton. The results indicate that if corn costs more or sugar beets less than these prices it would pay to substitute sugar beets for half of the corn ration.

In a second trial lasting 22 weeks, on similar rations, the gains were equal but the sugar beet and corn ration cost 9.55 cts. per pound and the corn ration 9.41 cts. From these trials it is estimated that from 4½ to 5 lbs. of sugar beets equal the results produced by 1 lb. of corn.

Ration experiment with lambs, 1906–7, 1907–8. Self feeders for hay, W. L. Carlyle and G. E. Morton (*Colorado Sta. Bul. 151, pp. 3–8, fig. 1*).—A ration of corn, uncut alfalfa hay, and oil meal fed to 125 grade Shropshire lambs for 6 weeks produced a total gain of 1,621 lbs. at a cost of 8.73 cts. per pound. With cut hay the total corresponding gain was 1,505 lbs. at a cost of 7.61 cts. per pound, but the hay eaten by the lot fed whole hay was double that eaten by the other lot.

In a second trial with corn and whole hay fed on the ground the total gain in weight of 200 lambs in 14 weeks was 6,742 lbs. at a cost of 4.89 cts. per pound. With corn and whole hay fed in a self-feeder, the total gain was 6,930 lbs. at a cost of 4.47 cts. per pound, and with corn and cut hay in a self-feeder, 7,655 lbs. at a cost of 4.48 cts. per pound. In this trial 4,700 lbs. less of hay was used by the lot fed whole hay in the self-feeder than by that fed cut hay. This may be accounted for by too wide an opening in the self-feeder where the lambs remove the hay, resulting in some waste of cut hay. The feeds were rated as follows: Corn, 1 ct. per pound, alfalfa hay, $5 per ton, cut hay, $6 per ton, and oil meal 2 cts. per pound. It is concluded that this trial shows no economy in cutting a good quality of alfalfa hay, although it is pointed out that changes in the construction of the self-feeders may result in a greater saving of the hay.

With reference to the value of the self-feeders, one trial "shows a considerable saving. With hay at $7 per ton, the self-feeders, costing $1 per running foot for materials, repaid their initial cost in one season, accommodating 6 lambs to the running foot."

Roots and corn silage for fattening lambs, W. J. Kennedy, E. T. Robbins, and H. H. Kildee (*Iowa Sta. Bul. 110, pp. 451–474, figs. 8*).—This bulletin reports the work of 3 seasons in which feeding tests were made to compare the value of corn silage, cabbage, and roots and to determine whether succulent feed was essential to rapid gain, high condition, and quality of finish in the winter fattening of lambs. The basal ration included alfalfa, timothy and clover hay, cowpea hay, corn, oats, bran, oil meal, and cotton-seed meal. The costs per head per day on the different rations are shown in the following table:

Cost of gains in lambs on rations containing different succulents.

Kind of succulent food.	Year.	Length of feeding period.	Daily gain per head.	Cost per pound of gain.	Dressed weight.
		Days.	*Pounds*	*Cents*	*Per cent.*
Mangels	1906	112	0.44	6.82	55.2
Sugar beets and mangels	1906	112	.45	6.86	54.0
Silage	1906	112	.42	5.90	55.0
None	1906	112	.37	6.33	51.9
None	1907	84	.38	4.71	....
Turnips	1907	84	.30	6.49	....
Sugar beets	1907	84	.41	5.30	....
Cabbage	1907	84	.30	6.40	....
None	1908	168	.30	7.60	....
Silage	1908	168	.29	7.98	....
Sugar beets	1908	168	.39	7.40	....
Mangels	1908	168	.37	7.62	....

The dry-fed lambs made slow gains at first, but later gains were much more rapid. The dry feed produced more economical gains than roots of any kind

when corn was at ordinary prices. During the first year when corn and silage were low in price, silage gave the cheapest gains with dry feed second.

"In each of the 3 years the lambs getting sugar beets made the largest total gain and matured more quickly than any of the other lambs. . . . The amount of dry matter required for each 100 lbs. gain was highest for the lots getting turnips and cabbage, and lowest for those getting mangels and sugar beets." "So far as finish was concerned all the rations produced market topping lambs so that the value of the feeds to the shepherd depended more on the rate and economy of the gains they produced." "Sugar beets and mangels favored the formation of renal calculi, or stones in the kidneys and bladder, with the possibility of an obstructed urethra and consequent fatal results to rams long fed on these feeds."

Influence of condimental stock foods on the digestibility of a corn ration fed to swine, L. G. MICHAEL ET AL. (*Iowa Sta. Bul. 113, pp. 81–119, figs. 3*).—These experiments on the influence of proprietary condimental stock foods on the digestibility of corn involved 24 pigs, representing several breeds.

The average gains per head per day with the different rations were as follows: With corn alone 0.901 lb., at a cost of 6.23 cts. per pound; corn and International stock food 0.894 lb., at a cost of 7.76 cts. per pound; corn and Iowa stock food 0.912 lb., at a cost of 6.84 cts. per pound; and corn and Standard stock food 0.902 lb., at a cost of 6.89 cts. There was no appreciable change in the digestion coefficients of protein or total organic matter when the different stock foods were added to the corn ration.

The following conclusions are drawn: "Stock foods did not have any beneficial effect on the digestion. Stock foods did not have any appreciable effect on getting greater gains from a corn ration than can be obtained from feeding corn alone. It required more feed to produce a pound of gain when stock foods were used than when corn was fed alone. A bushel of corn produced as much or more pork when corn was fed alone than it did when stock foods were added to it. The pork produced by corn alone returned a greater net value per bushel of corn fed than was returned when a stock food was added to the corn."

The value of stock foods for swine (*Iowa Sta. Bul. 113, popular ed., pp. 3–10*).—A popular edition of the above.

The value of corn, oil meal, cotton-seed meal, and gluten feed in work horse rations, W. J. KENNEDY, E. T. ROBBINS, and H. H. KILDEE (*Iowa Sta. Bul. 109, pp. 419–445*).—In this bulletin, feeding trials which have been continued for 2 years are reported in which concentrated feeds rich in protein were substituted for oats in rations for work horses used at the station.

The principal points considered were the health of the horses, degree of spirit maintained, ability to endure hard work and hot weather, maintenance of weight and flesh, and economy of the ration. The breeds of horses used were Shires, Clydesdales, and Percherons. In all cases, practically the same amount of protein, carbohydrates, and fat were fed in each ration. Timothy hay was fed a greater part of the time.

In the first experiment, corn and oil meal 10:1 constituted the grain ration for 1 lot, but when this was found too laxative it was changed to corn, oats, and oil meal 12:4:1, which gave excellent results. During a period of 100 days, this ration cost 23 cts. per head per day as contrasted with a ration of corn and oats which cost 24.6 cts. per day. The weights of the horses varied from week to week but this could be traced directly to the nature and amount of the work.

A comparison of gluten feed and oil meal for 91 days indicated that for horses that relish gluten feed, or with gluten feed having a more palatable flavor, as good results could be expected from its use as from an amount of oil meal fur-

nishing the same amount of protein with the ration, but there is no advantage in using it when a more palatable feed is at hand.

When cotton-seed meal was contrasted with oil meal for 154 days, the daily cost of feed per horse was only 0.1 ct. higher with the cotton-seed than with oil meal. In a final test of 77 days, the 2 rations gave very uniform results, but on the whole the cotton-seed meal gave more satisfaction. The ration containing it was fully as palatable and as efficient in maintaining the health and weight of the horses. It was less laxative and with cotton-seed meal at $30 per ton a little cheaper.

Among the conclusions drawn are the following: "The health, spirit, and endurance of work horses were the same when fed corn with a moderate amount of oil meal, or gluten feed, or cotton-seed meal, as when fed a corn and oats ration supplying a similar nutritive ratio. The ration of corn and oil meal maintained the weight, flesh, and appearance of the horses fully as well and with less expense than the one of similar nutritive value composed of corn and oats."

The sheep of the Carpathian mountains, C. de Beruosak (*Bul. Mens. Off. Renseig. Agr.* [*Paris*], *9* (*1910*), *No. 2, pp. 145–161*).—This gives an account of the sheep industry in the mountain region of northeastern Hungary.

The Racka sheep, a native dairy breed, the chief characteristic of which is hardiness, averages about 73 liters of milk during the pasture season, from which about 10 kg. of cheese are made. Details of making this cheese, called "lipto," are given. The wool, which is of poor quality, is sheared twice each year, yielding a total clip of about 1 kg. per head.

The author also reports his experience in importing improved breeds of sheep from Friesland which, when crossed with the natives, improve the quantity and quality of wool and increase the yield of milk.

[Swine husbandry in foreign countries], W. W. Ballantynf et al. (*Ottawa: Govt., 1910, pp. 60, pls. 21, figs. 6*).—This is a report of the Canadian commission appointed to investigate the swine breeding of other countries.

The countries visited were Denmark, Holland, England, Scotland, and Ireland. The methods of feeding swine and curing and marketing pork products, as practiced in those countries, are reported in detail. It is pointed out that for successful swine raising in Canada more cooperation is necessary among producers in selling their products. The erection of cooperative packing houses is recommended.

How to keep hens for profit, C. S. Valentine (*New York, 1910, pp. IV+298, pls. 16*).—A practical book on poultry, in which the importance of the poultry industry to the nation is discussed, and the best methods of breeding, feeding, and managing fowls are given in detail. Special attention is given to American breeds of fowl and the Indian Runner duck.

[Ostrich industry in Uruguay], F. W. Goding (*Mo. Cons. and Trade Rpts.* [*U. S.*], *1910, No. 355, p. 84*).—The consul at Montevideo reports that the nandu, or native ostrich, has recently decreased to such an extent that the government has taken steps to protect it.

This species of ostrich (*Rhea americana*), which is easily tamed and domesticated, is a native of Uruguay and Argentina. It resembles somewhat the African bird but is smaller, of a mixed gray color, and has 3 toes. When mature the birds weigh from 80 to 100 lbs. each and are about 5 ft. in height. The eggs average 2 lbs. each and require 40 days for incubation, which is done by the male. Each bird yields about 600 gm. (1.32 lbs.) of marketable feathers, worth from $3.10 to $6.20 per kilogram in Montevideo. In 1909 nearly 25,000 kg. (55,000 lbs.) was exported to France, Germany, Spain, and the United States.

DAIRY FARMING—DAIRYING.

Experiments with milking machines, N. O. HOFMAN-BANG (*Ber. K. Vet. og Landbohojskoles Lab. Landokonom. Forsog.* [*Copenhagen*], *68* (*1910*), *pp. 79. figs. 3*).—The experiments were conducted with the L.-K.-Gillie milking machine on the Ourupgaard dairy farm during the seasons 1907–8 and 1908–9. Four uniform lots of 10 cows and 4 heifers each were used in the first season's experiments, when two of the lots were milked by machine and two by hand during an experimental period of about 3½ months. One of the hand-milked lots was stripped by hand after having been machine-milked, while this was not done with the other lot until after 42 days from the beginning of the period when it was deemed necessary to do so on account of the decrease in the milk yield of the cows. In the second season's experiments 4 lots of 14 head each were formed, namely, 2 of aged cows and 2 of heifers; one of each of these was milked by hand and the other by machine. In this experiment the new Thule teat cup was used, which seemed to render it unnecessary to strip the cows after they had been machine-milked.

The results of the experiments showed that nearly the same amounts of milk were, in general, obtained by either method of milking. For the aged cows, however, hand milking appeared to give a small increase over machine milking, while the opposite was true for the heifers. The chemical composition of the milk was not affected by the method of milking adopted. No special difficulties were met with in operating the machine, and the cows stood quietly during the process of milking. The great difference in the ease of milking different cows and heifers by hand was found to be not nearly so pronounced by machine milking.

The results obtained indicate that one man with two machines (milking 4 cows) can do about the same work as three hand-milkers, and can milk 50 to 60 cows in 2 to 2½ hours. The bacteriological examinations of the milk drawn by the machine and by hand showed that machine-drawn milk may have a lower bacterial content than that of milk drawn by hand if both the machine and the teats of the cows are kept scrupulously clean. Care in keeping the teats clean is especially important from the fact that bacteria in dirt adhering to the teats are likely to be sucked into the milk pail with the air and will tend largely to increase the bacterial content of the milk.

Comparative experiments with cream separators, N. O. HOFMAN-BANG and P. V. F. PETERSEN (*Ber. K. Vet. og Landbohojskoles Lab. Landokonom. Forsog* [*Copenhagen*], *70* (*1910*), *pp. 125+86, pls. 3, figs. 11, dgms. 6*).—A critical study was made of the various factors that influence the separation of cream by centrifugal force under practical creamery conditions. The report gives a full description of the three power separators used, viz, (A) Alexandra, (B) Perfect-Gigant (patent Knudsen), and (C) Alfa Laval, A1, Model 1910, all of about 4,500 lbs. per hour capacity, with diagrams and illustrations, and describes in detail the various phases of the investigation.

The average percentages of fat as determined by the Gottlieb method in the skim milk for all comparative trials were for separator A, 0.076, B, 0.066, and C, 0.068. The average percentages of fat for the three skimming temperatures adopted were 0.061 at 75° C., 0.069 at 55°, and 0.076 at 35°. By varying the amount of cream obtained between 7 and 20 per cent it was found that the larger the percentage of cream the better skimming resulted. With 7 per cent of cream there was 0.088 per cent of fat in the skim milk, with 13 per cent, 0.068, and with 20 per cent, 0.065. The normal amount of milk run through the separators was about 4,000 Danish pounds, but the amount varied between 3,500 and 4,500 lbs., the average results for 3,500 lbs. being 0.067 per cent of

fat in skim milk, for 4,000 lbs., 0.069, and for 4,500 lbs., 0.071. The influence of the speed of the separator on the skimming is shown by the finding of 0.064, 0.067, and 0.074 per cent of fat in the skim milk, respectively, when the separators were run at 10 per cent above normal speed, normal speed, and 20 per cent below normal, this being the average for all three separators and skimming temperatures.

When the position of the cream screw remained the same, changes in the skimming temperature and the fat content of the milk caused but little variation in the percentage of cream obtained, but changes in the speed and the amount of milk separated caused considerable variation, increasing with larger amounts of milk separated or with lower speed. Separator C was most sensitive to these changes, and B least sensitive. The changes to which the percentage of cream is subject on account of changed speed or amount of milk separated tend to counteract the changes in the skimming efficiency which would otherwise appear, and they can sometimes wholly counteract these so that it may appear as if an increased speed or a smaller amount of milk separated gives a poorer skimming, and vice versa.

Trials on the influence of the fat content of the milk on the skimming showed that under otherwise similar conditions more fat will remain in the skim milk from rich milk than from poor milk, but not proportionately more, and that rich milk is therefore skimmed relatively better than milk low in fat.

The yield of butter obtained did not increase in quite the same proportion as the closeness of skimming, so that there appears to be a limit beyond which it is useless to carry the clean skimming if cleaner churning is not obtained at the same time. The trials made, however, show that this limit has not yet been reached, and it is therefore important in practical creamery work to skim as clean as possible.

In order to determine whether the separators under investigation worked satisfactorily as compared with those found in most Danish creameries, analyses of skim milk from the daily run in 426 creameries were made, and these ranged between 0.030 and 0.310 per cent, averaging 0.094. The difference between this percentage and the average for the three separators (0.070) represents about 1,000 lbs. of butter annually for an average sized Danish creamery.

Cream separators deliver the milk mixed with more or less foam. Separator A gave 45 per cent of foam, B 40, and C 37, on the average for all skimming temperatures. The higher the temperature the more foam, and at 35°, 55°, and 75° C., 35, 40, and 46 per cent of foam, respectively, was found in the skim milk; at increased, normal, and decreased speeds, 44, 42, and 38 per cent of foam, respectively, was obtained.

During the skimming, slime collected in the separators, but under normal conditions all three makes finished a whole run without its being necessary to clean them, and it was found that the slime did not affect the closeness of the skimming. Even when the bowls were so filled with slime that the percentage of cream was increased to about three times normal, the percentage of fat in the skim milk was not increased above normal in the case of any of the separators.

The power required for running the three separators was 2.38, 1.34, and 1.30 H. P. for A, B, and C, respectively, at normal speed and capacity, but as creameries can utilize fully all waste steam during the time the separators are running the loss of heat on account of a high power requirement of a separator can therefore only be estimated at about ½ lb. of coal per H. P. hour.

All the separators ran smoothly, and there was no appreciable wear on their bearings after 20 months' service. For separator A the inertia with respect to the perpendicular axis was 12 per cent larger than that with regard to an axis

at right angles to this; for separator B 14 per cent was found in the same way, and for C, 9 per cent. The smoothness of the run of the separators was furthermore determined by direct touch, and scored on a scale of from 0 to 15 points, the numbers 10 to 15 being considered excellent. As the averages of 5 scorings, separator A received 12.8, B, 12.9, and C, 14.2 points. By changing the 15 upper plates for 15 others taken at random at the factory stock rooms the steadiness of the run was not affected for any of the separators.

Variations in cream tests, C. H. ECKLES (*Missouri Sta. Circ. 37, pp. 13–16*).—This is a circular of popular information which discusses the causes of variation in the percentage of fat in separator cream.

Report of the dairy institute at Hameln, P. VIETH (*Ber. Milchw. Inst. Hameln, 1909, pp. 39*).—Trials of cream separators, comparisons of the Gerber and Gottlieb methods for testing milk, data on butter and cheese making, and related matters are reported.

Conservation of energy and its relation to the dairyman, W. J. FRASER (*Illinois Sta. Circ. 143, pp. 2–26, fig. 1*).—An address read before the Illinois State Farmers' Institute, February 24, 1910, in which attention is called to the great waste of energy caused by shiftless methods of ignorant and indifferent dairymen. Facts and figures are cited to show the great differences in profit between good and poor dairy cows.

Report of Östergötland County cow-testing associations, 1908–9, K. A. WESTMAN (*Östergötlands Läns Hushåll. Sällsk. Handl., 1910, No. 1, pp. 48*).—Fifty-six different associations were in operation at the close of the year and 46 during the entire year, representing 809 herds and 22,502 cows, or 20.8 per cent of the total number of cows in the county. The results obtained in the feeding and testing of the different herds are given in detail.

Breeding centers for cattle, J. EKELUND (*Meddel. K. Landtbr. Styr. [Sweden], 1908, No. 8 (137), pp. 362+VII*).—The report presents detailed results of the state competition for the production of milk and butter fat by pure-bred Swedish dairy cows of the mountain, Ayrshire, and lowland breeds during the years 1904–1905. This competition was arranged for by the government under regulations dated August 28, 1903, which stipulated that the individual cows in herds selected as "breeding centers" were to be regularly tested as to the production of milk and butter fat and their feed consumption determined. The owner was required to test the herd with tuberculin annually and to offer for sale bulls in the herd between 1 and 2 years old to the number of at least 10 per cent of the cows in the herd. The prizes offered for the herds found best suited to form breeding centers ranged between 300 and 1,000 krone and aggregated 9,000 krone (about $2,400) annually for the 2-year competition. The yields of the individual cows in the various herds for the years 1904 to 1908 are also given in the report.

The production cost of milk in the Stockholm district (*Nord. Mejeri Tidn., 25 (1910), No. 13, pp. 147–149*).—This study of the data furnished by Swedish cow-testing associations shows that the cost of producing 1 kg. of milk under the conditions prevailing in East Central Sweden amounts to 4.76 öre (1.1 cts. per quart). The various factors influencing the cost and the average yields of the cows in the testing association are discussed in some detail.

Cows fed on cactus, W. SINCLAIR (*Rural New Yorker, 69 (1910), No. 4048, pp. 601, 602, figs. 4*).—The advantages of the *Opuntia lindheimerii* and other species of prickly pear as a pasture for dairy stock are discussed. About 150 lbs. per head per day was the average feed for dairy cows. The methods of using gasoline for burning off the thorns are described.

Grass as a cow food, J. WRIGHTSON (*Agr. Gaz. [London], 71 (1910), No. 1894, p. 366*).—This is a record of the milk production of an English dairy herd of 27 cows. For the 3 weeks previous to being turned out to pasture the average

yield of milk per cow was 26.2 lbs. per day. During the first 3 weeks on grass the average yield per cow was 27.5 lbs. per day. The yield of 3 cows was unaffected by the change; in the case of 2 others there was a slight decrease.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 285, 287, pp. 1 each*).—These notices have to do with the adulteration of cream and milk respectively.

Butter scoring contest, 1909, H. A. HOPPER (*California Sta. Circ. 48, pp. 20, figs. 2*).—An account is given of the educational butter-scoring contest of 1909, in which the methods of making the butters obtaining the highest and lowest scores are described. Suggestions are given for grading the cream, preparation of starters, cream ripening, pasteurizing, and other matters relating to the composition of butter.

Report of continuous butter exhibitions at Copenhagen Experiment Station, 1909 (*Mælkeritid., 23 (1910), No. 13, pp. 331-340*).—In the exhibitions during the year 972 creameries took part, furnishing 2,973 tubs of butter. These were scored and examined for water content, shrinkage, and other points, in the usual manner. The average percentage of water in the butter was 14.23, but 84 tubs contained over 16 per cent, and 13 tubs less than 12 per cent. Ninety-two tubs leaked brine on standing.

VETERINARY MEDICINE.

The influence of feeding sugar beets and mangels to breeding animals with special reference to the formation of renal and urinary calculi, L. G. MICHAEL ET AL. (*Iowa Sta. Bul. 112, pp. 35-77, figs. 9*).—The impressions of stockmen that sugar beets and mangels cause the formation of renal and urinary calculi, followed by the discovery in 1904 of renal calculi in a shorthorn bull, which up to the time of death had received a normal hay and grain ration to which mangel-wurzels had been added, led the author to take up the investigation here reported, extending over a period of 5 years.

During 1904–5, 2 rams were fed mangels from January 20 to March 1 at the rate of 6 lbs. daily in addition to a ration of clover hay and ½ lb. of grain. From March 1 to March 15 the mangels in the ration were replaced by sugar beets. As a check 2 other rams were fed only hay and grain. Later all 4 were turned on pasture, no ill effects being observed, either during the experiment or afterward. During 1905–6, their ration consisted of hay, grain, and corn silage. In 1906–7, 2 additional rams were added to the experiment. During this test, one of the rams receiving hay and grain died under the experiment. After May 15, when the feeding ended, they were turned on pasture for the summer, all apparently remaining in perfect health. In the fall one of the 3 which received mangels was slaughtered, an examination showing the organs to be normal in all respects, and no calculi being found. During 1907–8, 2 ram lambs were added to the experiment, the 6 animals being divided into 3 lots of 2 rams each. "All animals were fed on a ration of 1.1 lbs. of corn daily in addition to all the hay they would eat. After the first 20 days one lot was fed sugar beets in addition to the hay and grain, and, similarly, a second lot received mangels. The roots were increased during the next 40 days to 17.6 lbs. daily besides corn and some hay. . . . The experiment began December 14, and ended April 9, and included daily examinations of feed, urine, and feces. At the end of the experiment 1 animal from each lot was slaughtered. A small calculus was found in the kidney of the sugar-beet fed ram. The kidneys of the mangel-fed ram were enlarged, while the kidneys of the ram receiving hay and grain only were normal."

The formation of a calculus in the sugar-beet fed ram led to a repetition of the experiment during 1908–9, the number of rams being increased to 42. A control lot of 11 received hay and grain; 9 received hay, grain, and corn silage; 11 received hay, grain, and mangels; and 11 received hay, grain, and sugar beets. The feeding began September 11 and ended April 14. On January 31, a ram of the sugar-beet fed lot died after being sick 1 day; several calculi too large to pass through the urethra were found in the bladder. On February 11, a ram of the mangel-fed lot died after being sick 2 weeks; the bladder from this animal was lost, but the kidneys were found to be very soft and friable. February 18, a ram of the sugar-beet fed lot was killed after having been sick for 2 days; the bladder was found ruptured, highly inflamed, and containing many small calculi. On April 11, a second ram of the sugar-beet fed lot died after a short illness, many small calculi being found in the bladder.

Thirty-two of the 36 rams remaining were sent to the packer in Des Moines on April 21, examinations of each carcass and viscera being made at the time of slaughter. The result of this examination is summarized in the popular edition of this bulletin, noted below, as follows: "The kidneys of all the hay and grain fed rams were normal. The bladders of 5 of them were normal, while in the other 4 the bladders were slightly affected. The hearts of all these rams were normal as well as were the livers, gall bladders, and other organs. Of the hay, grain, and ensilage fed rams 6 showed all internal organs entirely normal. In one of the others the kidneys were slightly affected, while the remaining ram showed a slight affection of the bladder. All other organs were normal. Of the 8 rams receiving hay, grain, and mangels, every one had the bladder and kidneys more or less affected, while many of them suffered from affection of some of the other internal organs as well. The same was true of the 7 rams that had been fed hay, grain, and sugar beets. One of these showed a large number of calculi in the calyces of the kidneys." The 4 rams remaining which had been fed in stalls, and whose feed, feces, and urine had been examined for a period covering 100 days were slaughtered at Ames. Their viscera showed the same results that had been obtained from the other rams. The 2 hay and grain fed rams had normal bladders, kidneys, hearts, and gall bladders. A mangel-fed ram had an enlarged bladder and enlarged kidneys with loose capsule. The kidneys were mottled and stained, of soft texture and pale color. The heart and gall bladder were enlarged. A sugar-beet fed ram showed an enlarged ulcerated bladder, and enlarged kidney containing a small calculus, and an enlarged heart and gall bladder.

The effects produced by adding sugar beets or mangels to a ration of hay and grain are discussed at length as to the digestibility and retention of dry matter, the gains made, the dressing percentages, the composition of the body, and of individual muscles, the organs of the body, the kidneys as to the large excretion of water and solids, the general progress of the disease, and the metabolism of nitrogen. Notes on the experiments follow. A summary and conclusions are considered in the popular edition noted below.

Do mangels and sugar beets cause kidney and bladder stones? (*Iowa Sta. Bul. 112, pop. ed., pp. 3–11, figs. 4*).—The summary and conclusions drawn from the investigations above noted are presented in this edition.

"While mangel-fed rams digested 11.10 per cent more dry matter than the dry-fed animals, they retained only 3.32 per cent more. That is, they lost through the kidneys 8.47 per cent more of the dry matter taken into the body than did the dry-fed rams. In the same way the sugar beet-fed rams lost 3.80 per cent more dry matter than did the dry-fed rams. This increased loss of dry matter is due to the leaching effect of the increased amount of water contained in the roots.

"The following comparison is based on the gains made in 1908–9 by the lots of 9 rams each that were fed over a period of 215 days. The daily average gain by the lot receiving hay, grain, and mangels was 0.292 lb.; by the lot receiving hay, grain, and sugar beets, 0.291 lb.; and by the lot receiving only hay and grain 0.229 lb.

"The sugar beet-fed rams dressed 5.80 per cent higher and the mangel-fed rams 3.85 per cent higher than did the dry-fed rams.

"The first influence of feeding roots on the composition of the body is to facilitate the deposition of fat in the tissues. . . .

"Almost without exception the vascular system of the rams receiving sugar beets and mangels was affected. The bladders, kidneys, hearts, and gall bladders were enlarged or otherwise affected. In most of the organs and often in the muscular parts of the body there were hemorrhages due to the breaking down of the capillaries.

"Because of the large amount of water contained in the beets and mangels—over 90 per cent—the animals eating them excreted large amounts of urine. This urine carried with it increased amounts of salts—urea, phosphates, etc. The first apparent effect of this increased activity of the kidneys was an increase in their size. This was accompanied by a softening of the texture, paling of color, and loosening of the capsule. The kidneys were "soggy" to the extent that often with little effort they could be pinched in two between the thumb and finger. As the kidney tissue was broken down, it offered nuclei on which the phosphate salts could crystallize, forming small calculi. Many of these were too large to pass from the kidney, and were cemented together to form larger ones. Others passed into the bladder, irritating it greatly. As these stones accumulated and increased in size, they finally obstructed the urethra, thus preventing the escape of the urine. As a result the bladder became distended, highly inflamed, and was finally ruptured."

The conclusions drawn are as follows: "Sugar beets and mangels favor the formation of renal and urinal calculi, or kidney and bladder stones, when fed to breeding rams. It is very probable that these roots have the same effect when fed to ewes, or to cattle. In view of the fatal results often attending the formation of these stones it would seem inadvisable to feed sugar beets and mangels to breeding animals. There is no particular danger in feeding sugar beets and mangels to fattening animals, as the calculi are not likely to develop sufficiently during the fattening period to cause serious results."

The production of calculus disease in breeding animals, L. G. Michael (*Berlin. Klin. Wchnschr., 47 (1910), No. 13, pp. 580–582, figs. 4*).—This account relates to the investigation noted above.

The enzyms of the mammary gland, W. Grimmer (In *Festschrift Otto Wallach. Göttingen, 1909, pp. 452–466*).—Investigations of extracts made from mammary glands of the sheep, bovine, goat, pig, and horse indicate that no soluble peroxydase exists under normal conditions, and that where this is present a pathological condition usually exists. Peroxydase is bound to the cell elements and can only be obtained by destroying the cell membrane mechanically. No difference in regard to peroxydase exists in the resting or secreting mammary gland. Animals yielding milk poor in or free from peroxydase had peroxydase in the glandular tissue. Catalase was also present in a large number of the glands and this exogenously. The greatest amounts were found in the mammary glands of the pig and horse, while the minimum amount was in the lactating gland of the cow. Aldehydecatalase, reductase, and hydrogenase could not be detected in either the lactating or nonlactating glands, and from this the author assumes that these enzyms have a bacterial origin when present

in the milk. Salolase was found in all lactating and some nonlactating glands. See also a previous note (E. S. R., 21, p. 574).

Biological proteid differentiation with rats and mice, R. TROMMSDORFF (*Arb. K. Gsndhtsamt., 32 (1909), No. 2, pp. 560–567; abs. in Biochem. Zentbl., 9 (1909), No. 7–8, p. 382*).—From this work it appears that it is possible sharply to differentiate the proteid of the rat from that of the mouse by both the precipitin and the complement binding reactions. The anaphylaxin test was not specific. From this it is evident that the mouse and rat are not so closely related biologically as it is generally assumed.

About the action of immune sera, E. WEIL and H. BRAUN (*Folia Serol., 3 (1909), No. 7, pp. 271–275; abs. in Biochem. Zentbl., 9 (1909), No. 7–8, pp. 361, 362*).—Immune sera are divided into two classes, namely, those which become inactive on treatment with bacteria and those in which the protective action remains unchanged. To the first class belong those which attack bacterial substance in the same manner as do the bactericidal and the bacteriotropic sera. The second group of sera produce no change on the bacterial substance, only reacting toward the secretion products of the bacteria and therefore being antitoxic and antiaggressive.

Detection of antigens and antibodies by the deviation of complement, A. MOSES (*Mem. Inst. Oswaldo Cruz, 1 (1909), p. 109; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 4, p. 188*).—The author was able by the aid of the complement binding reaction with numerous cases, among them being two cases of spirochetosis of chickens, to detect the antigens and antibodies. With hydrophobia, variola, and chicken plague the results were in most instances negative.

Experiments with vaccine, variola, and ovine, L. VOIGT (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 2, pp. 101–116, pls. 5; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 20, p. 410*).—The results are given of numerous experiments with sheep, monkeys, goats, pigs, and rabbits, in which the author was able to verify Bollinger's belief that vaccination with a foreign variety of pox protects the animal against subsequent attacks of the pox peculiar to the animal itself or against foreign varieties of pox, but does this only incompletely.

Variola in the monkey had the symptoms common to man (rash, etc.), but was milder in degree. Cattle, sheep, and goats reacted toward variola in the same manner as does the rabbit, i. e., localized fever-free areas of papules, macules, and pustules. The goats and sheep are only partially protected against variola by vaccination. The severer form of variola in the pig, contrary to the general belief, was not observable. With vaccine the localized areas of fever with the accompanying skin manifestations could be found in the pig and monkey, while with cattle, sheep, goats, and rabbits the skin manifestations were present without the fever.

Vaccine with the sheep and goat produced only incomplete immunity against a following infection with ovine. Lik[illegible]ise, ovine did not protect completely against subsequent infection[illegible].

The effect of Pasteur's anthrax vaccination on the meat and milk of the animal, N. ANTONI (*Ueber den Einfluss der Pasteur'schen Milzbrandschutzimpfungen auf Fleisch und Milch der geimpften Tiere. Inaug. Diss. Univ. Bern, 1909, pp. 31*).—Protective vaccination has no effect on the meat of vaccinated animals. Anthrax bacilli could not be detected microscopically or culturally in either the organs or extracts of the muscles. The findings with vaccinated goats, cows, and sheep were similar, and in addition vaccination had no perceptible effect on the offspring.

Combating aphthous fever, H. J. LOVINK (*Tijdschr. Veeartsenijk., 36 (1909), No. 14, pp. 861–876; abs. in Ann. Méd. Vét., 59 (1910), No. 3, pp. 168–170*).—An account of the occurrence of foot-and-mouth disease in Holland.

Ticks and the piroplasms of hedgehogs, W. L. YAKIMOFF (*Centbl. Bakt. [etc.], 1. Abt., Orig., 52 (1909), No. 4, pp. 472–477, pl. 1*).—A new species of Piroplasma found to occur in the district of Sarotov, Russia, in the blood of 16 of the 25 hedgehogs (*Erinaceus europæus*) examined, is described as *P. ninense*. The hedgehogs were found to be highly infested with the nymphs of the tick *Dermacentor reticulatus*, which in the adult stage transmits equine piroplasmosis (E. S. R., 22, p. 685). Attempts to infect colts with this new Piroplasma through the application of adult ticks bred from nymphs taken from infected hedgehogs, and through injections of blood from infected hedgehogs, failed. Similar results followed the injection of blood into several species of small animals. In addition to the hedgehog, the field mouse was also found to serve as a host for the nymphal stage of *D. reticulatus*.

Experimental attempts to infest horses with piroplasms from hedgehogs, A. WINOGRADOFF and W. YAKIMOFF (*Bul. Epizoot. Zemstvo Sarotov [Russia], 1908, No. 11; abs. in Bul. Inst. Pasteur, 7 (1909), No. 23, p. 1032*).—This account relates to the studies above noted.

Investigations of intra-uterine infection in tuberculosis, W. KLEIN (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 9, pp. 205–208; abs. in Jour. Compar. Path. and Ther., 23 (1910), No. 1, pp. 74–79*).—The subject is here reviewed at some length and investigations reported.

"Material from the liver, lungs, and spleen of 13 apparently healthy fetuses of more or less badly affected cows was inoculated into 117 guinea pigs. In each case the placenta was also tested as to the presence of tubercle bacilli by experimental inoculation. Not a single guinea pig of the whole number became tuberculous. In 2 cases in which the cotyledons contained tubercle bacilli guinea pigs inoculated from the corresponding fetuses remained healthy. . . . Material from 14 apparently normal pig fetuses and 58 guinea pig fetuses, including some of the placentas, was inoculated into 181 guinea pigs, and in only 4 fetuses (from a single female) were tubercle bacilli discovered. . . .

"The frequency of placental infection can be judged by examining the statistics of the slaughterhouses in Schleswig-Holstein and Mecklenburg, where it is customary to slaughter new born calves and calves only a few days old. At Kiel during the period 1895–1898, 21,858 calves under a week old were slaughtered, and of these, 138, or 0.63 per cent, were tuberculous. At Flensburg from 1899–1906, 24,822 calves were slaughtered, with 179, or 0.72 per cent, diseased. At Schwerin from 1894–1903, of 48,449 calves slaughtered, 103, or 0.21 per cent, were tuberculous. The percentage varies between 0.21 and 0.72, depending upon the varying prevalence of the disease among the adult cattle. . . . In Prussia only 0.15 per cent of calves slaughtered are tuberculous. . . . The relative frequency of fetal tuberculosis in cattle is therefore mainly ascribable to the peritoneal tubercul[illegible] is, so typical of the disease in cattle. . . . Intra-uterine tuberculous infection in cattle is not of extraordinary rarity, as it is in the human subject, and it occurs much more frequently than the extreme opponents of Baumgarten's theory suppose."

Detection and significance of tubercle bacilli in the circulating blood, SCHNITTER (*Deut. Med. Wchnschr., 35 (1909), p. 1566; abs. in Hyg. Rundschau, 20 (1910), No. 10, p. 536*).—This is a description of a method which was employed in 34 cases of pulmonary tuberculosis, of which 17 were in the third stage of the disease, 9 in the second, and 8 in the first. Tubercle bacilli were

found in the circulating blood in only the second and third stages, and then not in every instance.

About the complement binding reaction in tuberculosis, M. LAUB and J. NOVOTNY (*Wiener Klin. Wchnschr., 1909, No. 31, p. 1104; abs. in Biochem. Centbl., 9 (1909), No. 7–8, p. 368*).—Tests were conducted for the purpose of determining the value of the complement binding reaction for diagnosing tuberculosis. The antigens employed were Koch's old and new tuberculins and Paltauf's tuberculin. On the basis of the findings of the experiments the authors conclude the reaction is "nonspecific."

Tembladera, an affection of herbivorous animals in the region of the Andes, H. RIVAS and C. ZANOLLI (*Rev. Facult. Agron. y Vet. La Plata, 2. ser., 5 (1909), pp. 160–184, pls. 6; abs. in Berlin Tierärztl. Wchnschr., 26 (1910), No. 16, p. 340*).—A fungus, *Endoconidium tembladeræ*, which develops on grass (*Festuca hieronymi*) has been found to be the cause of a toxic disease of stock in South America. This affection, known as Tembladera, is met with particularly in the Andes region from northern Argentina northward. Horses, cattle, sheep, and goats are affected.

A contribution to the knowledge of Aujeszky's disease, KERN (*Közlem Összehasonl. Élet es Kortan Köréből. 8 (1909), No. 3–4, p. 108; abs. in Rev. Gén. Méd. Vét., 15 (1910), No. 172, pp. 208, 209*).—This disease, also known as infectious bulbar paralysis, although not rare in Hungary or Croatia does not appear to have been reported from other countries. Several cases observed in Croatia are here reported upon. On a farm where the disease was epizootic 3 bovines, 2 dogs, and a cat died within a period of 4 days. The author is of the opinion that the virus is transferred by some blood-sucking insect.

A contribution to the etiology of infectious bulbar paralysis, HUTYRA (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 7, pp. 149–151; abs. in Jour. Compar. Path. and Ther., 23 (1910), No. 1, pp. 91–93*).—Previous to 1902, when its etiology was demonstrated experimentally by Aujeszky, infectious bulbar paralysis had been unrecognized or confused with rabies. The affection is manifested during its very acute course principally by symptoms of pharyngeal paralysis and intense irritation of various parts of the body.

Since 1902, the disease has been observed repeatedly by Hungarian veterinary surgeons at different places and in different species of animals, no less than 21 cases having been seen during 1908 at the clinic for dogs and cats at Budapest. Balás ascertained that the disease was the cause of an enzootic among rats at a public abattoir and at the same time he saw a cat affected with it, which led him to suppose that there was a causal connection between the disease of dogs and cats on the one hand and the death among rats on the other.

During the course of an outbreak among cattle in Györ, inoculation experiments were made which showed that rats had died from the same affection. The author concludes that either the two species of animals contracted their illness from the same source or that an animal of the species first attacked transmitted the disease to the other species. While it is thought that rats may be agents in the dissemination of the disease, the manner in which the infective agent is transmitted to animals of different species still remains to be determined.

Simple notes on the common cattle diseases of Bengal, D. QUINLAN (*Dept. Agr. Bengal, Quart. Jour., 2 (1908), No. 1, pp. 45–50*).—The diseases noted are rinderpest, foot-and-mouth disease, anthrax, and hemorrhagic septicemia.

The histological changes in the kidneys of bovines with nephritis, M. W. G. BECKER (*Über die histologischen Veränderungen der Niere des Rindes bei Nephritis. Inaug. Diss. Univ. Bern, 1909, pp. 23*).—The results are given of a

histological examination of 35 cases of kidney affections other than pyelonephritis.

The author divides the cases on the basis of his findings into acute nonpurulent and metastatic purulent nephritis. The first group is again subdivided into glomerular nephritis, the acute with small celled infiltrations, parenchymatous, and hemorrhagic. Further classifications which are given are those with edema and chronic indurative nephritis.

Contributions to our knowledge of immunization against swine plague, R. E. E. BROLL (*Beitrage zur Immunisierung gegen Schweineseuche. Inaug. Diss. Univ. Bern, 1908, pp. 24*).—This work has to do with investigations of various methods which have been proposed for immunizing against swine plague.

From the results with young pigs it is noted that the preliminary intraabdominal injection of killed bacteria and the subsequent injection of living bacteria (according to Beck and Koske's method) predisposes to swine plague and does this before immunity can be attained. Intra-abdominal injections of killed bird bacteria and the preliminary treatment with living bacteria did not yield good results. A high degree of immunity was obtained against animals artificially infected by vaccinating with bacteria which had been heated for 20 hours at from 52 to 55° C. Autolysates as used by Titze and according to Conradi's method are not regarded as practical on account of their great degree of toxicity. The best results were obtained against artificially infected animals with extracts which were not filtered and which were obtained by centrifuging and subsequent sterilization with oil of mustard.

Experiments in regard to immunizing against swine plague, R. BASSENGE (*Ztschr. Expt. Path. u. Ther., 6 (1909), No. 3, pp. 689–694; abs. in Biochem. Zentbl., 9 (1909), No. 7–8, pp. 362*).—The author produces a glycerin paste from substances obtained from bouillon cultures of the *Bacillus suisepticus* by the aid of agglutination, centrifuging, and shaking out, which is capable of producing immune bodies. From the tests it appears that mice can be protected even after 3 weeks against superseding infection with the bacilli.

A contribution to the study of chronic bronchitis in the horse, F. GRÜTER (*Schweiz. Arch. Tierheilk., 51 (1909), No. 6, pp. 357–395; abs. in Vet. Rec., 22 (1910), No. 1140, pp. 739, 740*).—The author describes a special form of equine chronic bronchitis, provisionally designated as dry bronchitis, which he has repeatedly observed and studied, and the symptomology of which he especially contrasts with that of broken wind.

A bibliography of 69 titles is appended to the account.

Investigations of the number of erythrocytes and of the amount of hemoglobin in the blood of horses suffering from rheumatic hemoglobinemia in comparison with healthy horses and those suffering from other internal diseases, KÖNIG (*Monatsh. Prakt. Tierheilk., 21 (1909), No. 1–2, pp. 1–54; abs. in Rev. Gén. Méd. Vét., 15 (1910), No. 172, pp. 217, 218*).—The average number of erythrocytes found in healthy horses was 8,323,000 per cubic millimeter; in stallions 9,434,000 were found, in geldings 8,179,000, and in mares 7,357,000. The amount of hemoglobin in the blood of healthy horses varied from 95 to 105 per cent of normal. In rheumatic hemoglobinemia as a rule the normal number of erythrocytes was found but in every case investigated the amount of hemoglobin increased from the onset. Never in this affection was a diminution in the number of erythrocytes observed. This is considered proof that the increase in the amount of hemoglobin is not due to the disintegration of erythrocytes and a confirmation of Fröhner's theory that it is due to the passage into the blood of coloring matter from affected muscles.

In some internal diseases of the horse, as in different kinds of colics (83 cases), gastroenteritis (7 cases), gangrenous pneumonia (6 cases), tetanus (5

cases), acute encephalitis (2 cases), heat apoplexy (1 case), neuroparalysis (1 case), hemorrhage of the spinal cord (1 case), and in founder (1 case), the author found toward the end of the disease and also shortly before death a more or less marked increase in the number of erythrocytes and amount of hemoglobin. In petechial fever (3 cases), however, a decrease was found both in the number of erythrocytes and in the amount of hemoglobin.

A bibliography of 62 titles is appended.

The diagnosis of glanders by the precipitation method, W. PFEILER (*Arch. Wiss. u. Prakt. Tierheilk., 35 (1909), No. 4–5, pp. 323–337; abs. in Vet. Rec., 22 (1910), No. 1130, p. 588; Berlin. Tierärztl. Wchnschr., 26 (1910), No. 7, p. 155*).—The author employed two tests for this purpose, the mixing test (in which the serum to be examined is mixed with the precipitinogen reagent) and the strata or layer test (where if a horse serum is covered with a layer of distilled water, salt solution, or carbolic-salt solution there appears at the point of contact a gray-white ring which simulates the ring which appears when specific precipitins are present). There were 452 samples of blood examined, amongst which were 306 from glander suspects or from animals which were presumably exposed to the infection. All the cases were further controlled by either the complement binding reaction or the agglutination test.

From the results it is concluded that the deviation of complement reaction allows the detection of old and new cases, while the agglutination test will detect new cases but will not show cases where the disease has been of long duration. The precipitation test was always positive with recent cases and in most instances with old cases, and in only two cases were the results negative.

The prevention of strangles, DESOUBRY (*Bul. Soc. Cent. Méd. Vét., 87 (1910), No. 2, pp. 49–56; abs. in Jour. Compar. Path. and Ther., 23 (1910), No. 1, pp. 87–91*).—During an outbreak of this disease 30 cc. of anti-strangle serum was systematically injected into every healthy animal which had been exposed to infection and within a few hours of birth into all the foals born afterwards, and the disease stamped out. Since 1907 injections of serum have been given from the time of birth with the intention of preventing the disease, remarkable results being obtained. Among 650 animals which received injections from April 1, 1907, to May 31, 1909, not a single case of strangles was observed, although these were at places where the disease ordinarily occurred.

"The plan adopted in using Dassonville's serum as a protective agent, and the one which gave the best results, was to give a dose of 20 cc., (1) either at the time of birth or shortly after, on the following day or later; (2) when the foals, at about 6 months old, left the principal establishment for weaning. and had to be sent to stables at a distance; (3) at the time when they went away for training, when it was most important that they should be in the best of health to bear the strain that would be put upon them; (4) when an outbreak of strangles occurred in a stud, in order to immunize, if not already too late, those that had been exposed to infection."

The relation of fowl diphtheria to contagious epithelioma, G. SCHMID (*Centbl. Bakt. [etc.], 1. Abt., Orig., 52 (1909), No. 2, pp. 200–234, figs. 2; abs. in Hyg. Rundschau, 20 (1910), No. 10, pp. 545, 546*).—The results are given of an investigation with 60 cockerels and 83 hens from which the author concludes that it is possible to produce typical pock lesions in chickens having diphtheria, and further, that bird pox is not a separate disease but a part of the diphtheria and has the same etiology. Fowl diphtheria occurs in 3 forms: That affecting the mucous membrane, that affecting the skin, and a combination of the two.

Coccidiosis in the hare, Brachinger (*Abs. in München. Tierärztl. Wchnschr., 53 (1909), No. 17, pp. 310, 311*).—An outbreak of coccidiosis among hares is reported.

RURAL ECONOMICS.

The reorganization of American farming, H. C. Price (*Pop. Sci. Mo., 77 (1910), No. 5, pp. 462–466; Separate; Sci. Amer. Sup., 69 (1910), No. 1795, p. 339*).—The author shows that the tendency in the United States in all branches of agriculture is toward intensive methods of farming, which are demanded by the increase of population and the high prices of farm products. The doubling of the present yields of staple crops on the present acreage is predicted for the near future by intensive methods of culture.

A farm homes association (*Breeder's Spec., 4 (1910), No. 32, p. 5*).—This is an outline of a plan for settling people from cities and towns on land in Missouri and for training them in agricultural pursuits.

The plan includes organizing farm colonies laid out with reference to a principal central farm. A colony unit is to consist of one central farm of 160 acres, held by the association, and 32 surrounding farms of 40 acres each which will be sold to the settlers on a plan of easy payments covering 10 to 15 years, and not including the first year. Upon the main farm in each colony will be agricultural experts to train the settlers in practical farming and in the use of farm machinery. The central farm will also serve as the headquarters for marketing the produce raised in the colony. The scheme is believed to contain economic merit as a financial and business proposition.

Farm homes for the homeless (*Iowa Homestead, 55 (1910), No. 22, pp. 6, 12*).—A more detailed account of the above plan with a discussion of its economic and social possibilities.

The inalienable property of the family (*Jour. Agr. Prat., n. ser., 19 (1910), No. 10, pp. 305, 306*).—This is a summarized account of a conference held January 25, 1910, at the Musée Social in Paris for discussing the best way of establishing inalienable family property as a means of counteracting rural depopulation. Government aid to farm laborers in Denmark is shown to have increased by 3,830 during the years 1900 to 1908, inclusive, the number of small proprietary holdings, ranging in size from 2½ to 17 acres, and the increase of small holders by making the property inalienable, by extending personal credit, and other means is advocated for stopping rural depopulation in France.

Notes on rent, labor, and joint ownership in Egyptian agriculture, W. Cartwright (*Cairo Sci. Jour., 4 (1910), No. 41, pp. 29–36*).—Methods of paying agricultural rents and wages in various districts of Egypt, together with the systems of payment for and joint ownership of live stock, are reported as a result of the author's personal investigations and discussed in their economic bearings.

The uses of agricultural banks, J. Brett (*Irish Homestead, 17 (1910), No. 18, pp. 371, 372*).—This is a discussion of the functions of agricultural mutual credit banks, with more particular reference to the origin, development, and success of the agricultural bank at Ballyragget, Ireland.

[The question of credit in agriculture], J. Ruau (*Jour. Agr. Prat., n. ser., 19 (1910), No. 11, pp. 331–334*).—This is an address made by the minister of agriculture before the National Agricultural Society of France at its meeting held at Paris, January 12, 1910.

The paper gives a history of agricultural credit in France, the obstacles which had to be overcome, the great progress made since 1894 with statistics for the year 1909, the different forms of credit, the extension of credit to the

small holder, and the lines along which agricultural credit can be developed in the future. The latter includes the extension of long-time credit to the small holder on the basis of individual responsibility. Data regarding agricultural credit in France at the close of 1909 are as follows: District banks number 96 with 3,127 affiliated local banks having 147,140 members, and loans were made during the year of 115,000,000 francs. These are substantial gains over 1908 (E. S. R., 22, p. 194).

Long-term individual credit for farmers (*Bul. Mens. Off. Renseig. Agr. [Paris], 9 (1910), No. 3, pp. 213, 214; Jour. Agr. Prat., n. ser., 19 (1910), No. 12, p. 362; Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 15, pp. 454, 455*).—The text of the law of March 19, 1910, which extends the privilege of long-term loans to farmers for facilitating the acquisition, partition, improvement, and reconstruction of small proprietary holdings in France on the basis of individual responsibility, is reported.

Long-term individual credit for farmers, G. BECCI (*Bul. Soc. Agr. France, 1910, Apr. 15, Sup., pp. 200-202*).—The provisions of the above law are summarized and discussed. Although recognizing the importance of legislation which seeks to increase the number of small rural owners, who are considered essential to national prosperity, the author raises the objections that the law has a tendency to interfere with the free operation of economic forces and does not in itself make definite provision for determining the rate of interest, the duration of loans, and the conditions of repayment.

Long-term individual credit for farmers (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 17, pp. 514-516*).—This is a government decree, made March 26, 1910, providing for carrying out the law relating to long-term loans to farmers. The decree meets the last objection raised by Count G. Becci noted above.

The law of April 5, 1910, concerning the pensioning of workmen and peasants (*Bul. Mens. Off. Renseig. Agr. [Paris], 9 (1910), No. 4, pp. 349-363; Bul. Soc. Agr. France, 1910, Apr. 15, pp. 431-450*).—The text of the French law, which includes the different classes engaged in agriculture, is reported.

The pensioning of workmen and peasants (*Semaine Agr. [Paris], 29 (1910), No. 1507, pp. 121-123*).—The provisions of the above law which relate to the insuring and pensioning of the different classes of workers engaged in agriculture are here summarized and discussed.

Agricultural products shipped into Colorado in 1909, H. M. COTTRELL (*Colorado Sta. Bul. 153, pp. 4-24*).—Estimates based on information secured from reliable sources show that the value of meat and meat products, dairy and poultry products, cereals and breadstuffs, hay, seeds, fruits, and miscellaneous food accessories shipped into the State in 1909 was $32,616,140. The data are presented with a view of showing that "nearly every agricultural product shipped into Colorado could have been more easily produced in the State, at a greater profit, and under conditions more enjoyable for the producer than in the sections where it originated," and emphasize the opportunities the State offers in the various branches of agriculture.

Agriculture in the State of New York (*Bradstreet's, 38 (1910), No. 1661, p. 286*).—A discussion of the lack of farm labor, of possible means of supplying it, and of the advisability of changing the size of farms and farming methods to meet existing labor conditions is given.

The increased yield per acre of wheat in England considered in relation to the reduction of the area, H. D. VIGOR (*Jour. Roy. Statis. Soc., 73 (1910), No. 4, pp. 396-408, dgm. 1*).—"The aim of the present note is to investigate the change in the yield of the wheat crop during the period from 1885 onward, for which official returns of the production per acre in England are available, and

to trace whether some of the increase shown in the returns may or may not be due simply to the withdrawal of less productive soils from the crop."

The results obtained are summarized as follows:

"(1) The reduction of the wheat area has been accompanied by a rise of the yield per acre in England as a whole.

"(2) The yields of separate counties have shown a slight tendency to level up.

"(3) Counties of low yields do not appear to have been specially selected for a reduction of area.

"(4) Improvements of the yields appear, to some extent, to be greatest in those counties where the proportionate reductions of area have been greatest."

The paper is followed by a discussion.

Prices of agricultural produce (*Jour. Bd. Agr.* [*London*], *16* (*1910*), *No. 12, pp. 1047–1051*).—Statistics on the average prices of live stock, meat, provisions, potatoes, and hay in England and Scotland during February, 1910, and of wheat, barley, and oats during 1908, 1909, and to March, 1910, are reported. The cereal prices are compared with those in France, Belgium, and Germany.

Investigations on the profitableness of agriculture in Switzerland during 1908, E. Laur (*Landw. Jahrb. Schweiz, 24* (*1910*), *No. 2, pp. 25–153*).—In addition to the usual data (E. S. R., 21, p. 189) on yields, value, exports, prices etc., of farm produce raised in 1908, there is an account of the profitableness of agriculture as determined by the detailed returns from 287 farms.

The exportation of agricultural products from Denmark in 1909, Beaucaire (*Bul. Mens. Off. Renseig. Agr.* [*Paris*], *9* (*1910*), *No. 2, pp. 173–175*).—Statistics on the quantity, prices, and destination of butter, cream, milk, lard, eggs, live beef cattle, meat, and horses exported from Denmark in 1909 in comparison with similar data for the two preceding years are presented and discussed. While the exportations of certain products diminished in quantity, the price as a rule was higher, so that the Danish farmers reaped as favorable returns as in 1908.

AGRICULTURAL EDUCATION.

Institutions in the United States giving instruction in agriculture, Marie T. Spethmann (*U. S. Dept. Agr., Office Expt. Stas. Circ. 97, pp. 15*).—These classified lists include 57 collegiate institutions for white students receiving aid from the Federal Government, 24 privately endowed colleges giving secondary instruction in agriculture, 58 special agricultural high schools and 28 public high schools receiving state aid, 2 privately endowed agricultural high schools, 156 normal schools and industrial schools for women, 432 public and private high schools and academies teaching agriculture without state or federal aid, 18 institutions offering correspondence or reading courses in agriculture, 34 special elementary schools teaching agriculture, and the 46 secondary and 20 elementary schools teaching agriculture for negroes and Indians, a total of 875 institutions, and an increase of 330 since the issuance of a previous list in October, 1908.

University Farm School, Davis, California (*California Sta. Circ. 51, pp. 22, figs. 11*).—This circular gives a description of the farm and buildings, general information concerning the daily work of the institution, and announcements for 1910–11.

Suggestions on rural education, T. S. Dymond (*London: Bd. Ed., 1908, pp. VI+54*).—The object of this pamphlet is to assist in some degree in adapting rural education to the conditions of rural life.

miscellaneous and technical publications issued during the year; and announcements and notes on the work, personnel, and equipment of the station.

Report of the Agricultural College of Norway, 1908–9, N. OEDEGAARD (*Ber. Norges Landbr. Höiskoles Virks., 1908–9, pp. 244+237, pls. 4, figs. 34, dgms. 2*).—The report gives the usual account of the instructional and research work of the Agricultural College of Norway at Aas for the year ended June 30, 1909, including temperature measurements of the soil taken in 1908 at Aas, Bodö and Stend, with averages for 1900–1908, by G. Holtsmark, a table for determining the percentage annual increase in growth of forest trees, by J. Kaurin, and a report on the manufacture of peat litter and on drainage of marsh lands, by S. Hasund, and other data.

Monthly Bulletin of the Department Library, April, 1910 (*U. S. Dept. Agr., Library Mo. Bul., 1 (1910), No. 4, pp. 75–102*).—This contains a tentative program of the Agricultural Libraries Round Table meeting held at Mackinac Island from June 30 to July 6, 1910, and data for April, 1910, as to the accessions to the Department Library and the additions to the list of periodicals currently received.

NOTES.

Colorado College and Station.—H. M. Bainer, professor of farm mechanics and instructor in dairying in the college and in charge of farm machinery investigations in the station, has resigned to become agricultural demonstrator for the Santa Fe Railway system.

Georgia College.—The extension department has recently held several teachers' institutes at which courses of agricultural instruction have been outlined. The interest shown by the teachers has been very gratifying and indicates that the institute method is a feasible means of introducing agricultural instruction into the common schools. A. Maclaren and R. L. Nixon, of the extension department, have resigned, the former to accept a position in Toronto, Canada, and the latter to accept the principalship of the Tenth District Agricultural School at Granite Hill.

The honorary degree of doctor of science was conferred upon President Soule at the recent commencement of the University of Georgia.

Preparations are in progress for the erection of a veterinary hospital in which it is planned to manufacture and distribute hog-cholera serum.

Illinois Station.—Additional permanent soil experiment fields have been located at Mount Morris, Dixon, La Moille, Minonk, Aledo, Carthage, Carlinville, Lebanon, Ewing, Raleigh, and Unionville. These fields comprise about 20 acres each of land selected for the purpose because of its uniformity, representative character, and accessibility to visitors. Two additional tracts of land have been also purchased and added to the permanent equipment of the department of horticulture, one a 20-acre orchard in bearing at Olney, and the other a 76-acre farm 1 mile east of Olney.

Arrangements have been practically completed by the department of dairy husbandry for establishing a cow test association among the dairymen in the vicinity of Harvard. A contest, to be known as the Illinois Competitive Cow Test, is being arranged for the purpose of arousing more interest in breeding and better methods of feeding. A fund of $1,000 has been secured for cash prizes in this contest, and in addition there will be extensive merchandise prizes.

Massachusetts College and Station.—President K. L. Butterfield received the honorary degree of doctor of laws at the recent commencement of Amherst College. Dr. B. N. Gates, of the Bureau of Entomology of this Department, has accepted the assistant professorship of bee culture, and in addition to instruction will carry on experiments for the station and act as state inspector of apiaries.

In the station, Sumner C. Brooks, a 1910 graduate of the college, has been appointed assistant in botany and vegetable pathology, and David W. Anderson, a graduate of the New Hampshire College, graduate assistant in horticulture, chiefly for work in plant breeding.

Missouri University and Station.—H. O. Allison, assistant animal husbandman in the Illinois University and Station, has been appointed assistant professor of animal husbandry. He will have charge of the breeding herds of beef cattle and the cattle feeding experiments. Other recent appointments include L. A. Weaver, a graduate of the university, as assistant in animal husbandry, W. J. Hendrix, a graduate of the Ohio State University, as assistant in agronomy, L. A. Morgan, of the Nebraska University, as assistant chemist in the station to succeed Dr. C. K. Francis, who has resigned to accept the

professorship of agricultural chemistry in the Oklahoma College, and H. E. McNatt as extension assistant in the dairy department.

The university has organized an extension division which is to include the extension activities of the college of agriculture.

New Jersey State Station.—Victor B. Hausknecht, a graduate of Pennsylvania College, has been appointed assistant chemist, vice Leon A. Congdon, resigned.

North Carolina College and Station.—John Michels, professor of animal husbandry and dairying and dairy husbandman, has resigned to engage in commercial work.

North Dakota College.—A special train recently sent out over the Northern Pacific lines is believed to represent the varied activities of farm life with unusual completeness. The exhibits and demonstrations included domestic science, farm machinery, dairying, live stock, grain growing, horticulture, poultry, and a farm library exhibit.

Ohio Station.—Contracts have been let for the construction of an abattoir and cold storage plant for use in the nutrition investigations, to cost about $20,000. Paul Work has been appointed assistant horticulturist, in charge of vegetable gardening, and Harry J. Christoffer assistant botanist.

Oregon College and Station.—*Science* announces the resignations of E. F. Pernot as professor of bacteriology and bacteriologist to enter commercial work, and of J. C. Bridwell, instructor in zoology and entomology and assistant entomologist, to accept a similar position at the University of California. G. W. Peavy has been appointed professor of forestry, vice E. R. Lake, who has been granted leave of absence. J. F. Morel has been appointed instructor in veterinary science.

Porto Rico Station.—Under the auspices of the Insular Department of Education the station staff has been conducting a 6-week course of lectures at the University of Porto Rico, beginning July 5. Among the subjects taken up were arboriculture and forestry, apiculture, school gardening, insect pests and diseases of Porto Rican plants, tropical crops, school hygiene, drainage and bacterial diseases, and animal production.

Rhode Island Station.—Cooperative experiments with alfalfa are being carried on this season on about 50 farms. There has been found to be hardly an instance where liming has not been highly beneficial, and in some cases alfalfa could not be grown at all unless lime was used. Thus far, as a rule, slaked lime has been more efficient than ground limestone or ground magnesium limestone, though there are a few instances where the results have been otherwise. The slaked lime, ground limestone, and ground magnesium limestone were used in such quantities in all cases as to neutralize the same amounts of acid.

South Dakota College and Station.—The dairy barn has been nearly completed, at a cost of about $10,000. It is planned to use a portion of the building for class rooms and experimental laboratories.

The school of agriculture has completed its second year with an increased attendance, and seems to meet with much favor from the people of the State. Recent appointments in the college include Dr. G. L. Brown as dean, W. H. Irvine and W. D. Bailey, graduates respectively of the Ontario and Massachusetts colleges, as assistants in dairying, and W. L. Burlison, formerly of the Oklahoma College and Station, C. M. Woodworth, Howard Loomis of Albion College, and Howard Biggar of the South Dakota College, as assistants in agronomy.

Wisconsin University and Station.—Dr. C. W. Stoddart, assistant professor of soils and assistant soil physicist, has accepted the professorship of agricultural chemistry in the Pennsylvania State College.

U. S. Department of Agriculture.—Dr. C. Hart Merriam has resigned as chief of the Bureau of Biological Survey and has been succeeded by H. W. Henshaw,

who has been administrative assistant. Dr. Merriam is to retain an official connection with the Survey as consulting biologist, but is to devote himself particularly to the preparation of a monograph on the mammals of North America under an endowment provided by Mrs. E. H. Harriman.

Recent Appointments in the Philippine Islands.—Charles R. Jones, formerly of the Bureau of Entomology of this Department, has accepted an appointment as entomologist to the Philippine Board of Agriculture, with headquarters at Manila. Dr. W. H. Boynton, instructor in pathology at the New York State Veterinary College, has accepted an appointment as pathologist in the veterinary service of the islands.

Increased Imperial Assistance to Agriculture in England.—What is believed will prove the nucleus for greatly increased assistance to British agriculture by the imperial government is an act passed by the recent Parliament known as the Agricultural and Road Development Act. This measure is very comprehensive in its scope, the initial clause providing for "aiding and developing agriculture and rural industries by promoting scientific research, instruction, and experiments in the science, methods, and practice of agriculture, including farmers' institutes, the organization of cooperation, instruction in marketing produce, extension of small holdings, and adopting any other means which may develop agriculture and rural industries." Under the provisions of this act a board of 8 commissioners has been appointed, consisting of Lord Richard Cavendish, chairman, Sir Francis Hopwood, vice-chairman, S. Eardley-Wilmot, William Haldane, M. A. Ennis, John Davies, Sidney Webb, and A. D. Hall. It is expected that particular attention will be devoted at the outset to afforestation and road improvement.

The president of the Board of Agriculture and Fisheries has appointed a committee of 15 to advise the board on all scientific questions bearing directly on the improvement of agriculture, and especially as to methods to be adopted for promoting agricultural research in universities and other scientific schools, aiding scientific research workers, and insuring that new scientific discoveries are utilized for the benefit of agriculture. T. H. Middleton, of the board, will serve as chairman of this committee, other members of which are the Duke of Devonshire, Prof. J. B. Farmer, Dr. R. Stewart Macdougall, P. Spencer Pickering, and Stewart Stockman.

A rural education conference of 42 members has been recently constituted by the presidents of the Board of Agriculture and Fisheries and the Board of Education for the discussion of all questions connected with education in rural districts and those of interest to agriculturists and the two boards. Hon. Henry Hobhouse is chairman of this conference, which includes among other members Maj. P. G. Craigie, A. D. Hall, William Somerville, and T. B. Wood.

Appropriations for Canadian Agriculture.—The appropriations for the Canadian Department of Agriculture for the ensuing year as recently authorized aggregate $1,037,000, an increase of $165,000 over the present year. Some of the principal items are $185,000 for the maintenance of experimental farms, including an increase of $45,000 for the establishment of additional farms; $10,000 for the publications of the experimental farms; $168,000 for exhibitions; $5,000 for the 5 stations for the fumigation of nursery stock; $100,000 for the development of the dairy and fruit industries; $82,000 for the establishment of cold storage warehouses and experiments in cold storage for fruit; $52,000 for the development of the meat industry; $250,000 for animal diseases; $50,000 for the seed inspection work; $20,000 for the enforcement of the meat and canned foods acts; $5,000 for tobacco investigations; and $10,000 for the International Institute of Agriculture.

International Congresses at Brussels.—The International Congress of Tropical Agriculture, which met May 20–23, was organized into sections dealing with

agriculture and forestry, animal industries, and labor, transport, and trade. About two hundred papers and reports were submitted. These were mainly in the first section where the principal topics considered were the culture of cotton and rubber in tropical countries, wheat breeding investigations, tobacco growing, and the Zanzibar clove industry. In section 2 the principal topic was the acclimatization of European cattle in the Tropics. During the congress a special meeting was held of the International Association of Colonial Agriculture, at which Prof. Wyndham Dunstan, director of the Imperial Institute, was elected president.

The International Horticultural Congress was held April 30 to May 3, and was well attended. The subject of horticultural nomenclature received particular attention. The principal business transacted was the adoption of the rules promulgated at the 1905 congress at Vienna, with certain necessary additions in the case of horticultural varieties and hybrids.

Necrology.—Prof. Edouard Van Beneden, the Belgian zoologist, well known for his contributions on embryology and the mechanics of cell division, died April 28, 1910. He was born at Louvain March 5, 1846, and began teaching zoology at Liége in 1871. Three years later he was promoted to the grade of professeur ordinaire, a position which he held the remainder of his life. Though his researches were in the realm of pure science, the results which he obtained provided the foundation for many current investigations on the principles of breeding. His first paper, which was published in 1869, was on the composition and signification of the egg. His later cytological studies rank with those of Hertwig and Strassburger in importance and he made many contributions to the knowledge of the tissues of the developing embryo of many species of animals. In his studies of intestinal worms he was the first to show that for the ovum the chromatic threads are a portion of the existing network of the nucleus and that the two-daughter chromosomes are alike and pass to the opposite holes of the spindle. He discovered the centrosphere and was the first to demonstrate the importance of the centrosome in cell division. Perhaps his most important work was the demonstration of the halving of the number of chromosomes in gametogenesis. He founded and edited the *Archives de Biologie*, in which some of his most important work was published. Professor Van Beneden was the recipient of many honors from European universities and scientific societies.

Hon. A. C. Bird, dairy and food commissioner for Michigan since 1905, died May 27, at the age of 46 years. He was a graduate of the Michigan Agricultural College and for several years a member of its governing board.

Miscellaneous.—The Fourth International Congress of Genetics will be held in Paris in September, 1911, under the auspices of the National Horticultural Society of France. Dr. P. de Vilmorin will act as secretary.

Deutsche Landwirtschaftliche Presse announces that the Dairy Experiment Station and Institute at Kleinhof-Tapiau was on April 1 removed to Königsberg, where it is housed in some recently erected buildings of the Königsberg Cooperative Dairy Association.

The Agricultural Experiment Station of the Chamber of Agriculture of the District of Cassel was removed in June from Marburg to Harleshausen, near Cassel.

Wiener Landwirtschaftliche Zeitung announces the retirement of Prof. Leopold Weigert from the directorship of the Royal Imperial Viticultural and Pomological School at Klosterneuburg, after a service of thirty-five years.

Dr. L. Wittmack, of Berlin, has been appointed rector of the Agricultural High School of Berlin for two years, beginning April 1, 1910.

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EXPERIMENT STATION RECORD.

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RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Contributions to soil analysis, J. H. PETTIT (*Jour. Landw.*, *57* (*1909*), *No. 3, pp. 237–267, fig. 1; abs. in Jour. Chem. Soc.* [*London*], *98* (*1910*), *No. 567, II, p. 65; Analyst, 35* (*1910*), *No. 409, p. 177*).—These experiments were conducted for the purpose of obtaining knowledge as to the plant nutrients extracted by dilute solvents and the relation of these nutrients to the fertility of the soil. Particular effort was made to establish a relationship between the results obtained by the methods of von Sigmond (E. S. R., 19, p. 6) and Schloesing (E. S. R., 15, p. 344).

From the results obtained with the 6 soils examined it is evident that there is a definite natural limitation of the solubility of soil phosphates. If the basicity of the soil is considered, the uniform active concentrations of the nitric acid lie within certain definite limits, namely, about 400 to 800 mg. N_2O_5 per liter of the acid soil extract solution. The potassium oxid of the 6 soils with the method employed showed some differences in regard to solubility, some being slightly soluble and others readily soluble. Only in the case of the loam was a uniform effective concentration found. The relation existing between the soil and the total phosphoric acid or the potassium oxid content (soluble in hydrochloric acid of specific gravity 1.15) is not the same as that which is present when these are dissolved out with nitric acid. Shell marl, for instance, although it contains more total phosphoric acid than new red sandstone (buntsandstein), has only one-third as much easily soluble phosphoric acid as the latter. Loam contains two and one-half times the quantity of potassium oxid which the new red sandstone contains, but its content of easily soluble potassium oxid is only about three-fourths of that of the latter.

The results of pot experiments with buckwheat, barley, potatoes, and loamy and shell marl soils corresponded closely with those obtained from chemical analysis. The amount of potassium oxid and phosphoric acid which was taken up by these plants, with one exception, was not the same as that soluble in dilute nitric acid. Further, there was no general relationship between the phosphoric acid and potassium oxid absorbed by one plant from the 4 soil pots and the readily soluble phosphoric acid and potassium oxid which was originally present in the soils. The various plants exhibited much difference in their capacity for taking up nourishment from the soil. Buckwheat, for instance, absorbed from a loamy soil three and one-half times as much potassium oxid and twice as much phosphoric acid as barley, which makes it obvious

that with a single solvent it is not possible to determine the assimilable nutrients contained in the soil with reference to all plants. The expressions "assimilable phosphorus" or "assimilable potash" should therefore be eliminated as they are confusing, and it is better to employ the general term "easily soluble substances," as estimated by the von Sigmond method.

Contribution to fertilizer and soil analysis, E. A. MITSCHERLICH ET AL. (*Landw. Jahrb., 39 (1910), No. 2, pp. 299-334, pls. 2, fig. 1*).—The authors draw attention to the fact that while the methods for fertilizer and soil analysis and their results are sufficiently accurate for the buyer and seller they do not furnish a satisfactory explanation for the variations in results obtained with the same fertilizer during plant growth.

The solubility of a fertilizer depends upon four factors, namely, the time, the temperature, the carbon dioxid content of the solvent, and the amount of solvent. It appears from the results obtained with dibasic and tribasic calcium phosphate, however, that the time factor can be lessened to a great degree by using larger amounts of water, and that it also depends to a great degree upon the nature of the phosphoric acid fertilizer. In regard to the relation of the carbon dioxid content to the rapidity of solution, it appears that the rate of solution is directly proportional to the amount of carbon dioxid in the water and the undissolved salt which is present. The function of temperature seems to be to increase the solution rate of phosphoric acid in the presence of potash and nitrogen salts, but with phosphoric acid and calcareous salts this was not the case as a temperature varying between 10 and 20° C. seemed to be the culminating point.

In order to estimate the actual amount of solvent required for extracting the phosphoric acid in fertilizer analysis, with particular relation as to how much would be taken up by the plant, the authors have compiled two tables, one which is a summary of the results of solution experiments with water saturated with carbon dioxid at a temperature of 30° C. and a time limit of 24 hours, and the other a table which had been calculated for the same purpose.

For nitrogen fertilizers only such materials were selected as contained nitrogen in several forms, for instance, Peruvian guano and one prepared from red clover. It is shown that a definite carbon dioxid content in a water has no effect on the solubility of the nitrogenous bodies. Time also had no influence, and the effect of the amount of solvent was practically negative. In a test to determine whether carbonated water had any selective action upon the various forms of nitrogen present, it was found that with the Peruvian guano 6.8 per cent was insoluble and with clover hay 62 per cent, which, according to the theory of the authors, is considered "nonavailable matter."

From the results of the soil tests appended it appears that the results hold good for soils as well as for fertilizers.

A new method for estimating potash in soils, L. E. CAVAZZA (*Nuovo Metodo per Dosare la Potassa. Alba, 1910, pp. 8*).—The soil, which has been dried at 100° C., is digested in 10 per cent hydrochloric acid on the water bath. To the solution obtained therefrom oxalic acid is added, the solution evaporated to dryness, ignited, and weighed as potassium carbonate.

Bacteriological methods for determining the available nitrogen in fertilizers, J. G. LIPMAN (*Jour. Indus. and Engin. Chem., 2 (1910), No. 4, pp. 146-148*).—The use of tests of the rate of ammonification in addition to nitrification is explained.

A mechanical agitator for phosphate analysis, R. FRAILONG (*Bul. Assoc. Chim. Sucr. et Distill., 27 (1910), No. 9, pp. 864-866, figs. 3*).—A description and an illustration of the apparatus are given.

Iodometric estimation of the phosphorus and magnesium in phosphate precipitates, R. BRANDIS (*Ztschr. Analyt. Chem.*, *49* (*1910*), *No. 3–4*, *pp. 152–157*).—A method is described, in which the magnesium is precipitated as magnesium ammonium phosphate and the ammonia determined by a method which has practically the same basis as that of Artmann previously noted (E. S. R., 22, p. 705).

Methods for the quantitative estimation of inorganic phosphorus in vegetable and animal substances, E. B. FORBES ET AL. (*Ohio Sta. Bul. 215*, *pp. 459–489*).—The authors found it necessary to obtain a method for inorganic phosphorus which did not have the disadvantages possessed by the Hart and Andrews' method (E. S. R., 15, p. 496). It is shown that with the latter considerable difficulty is encountered in extracting the total amount of inorganic phosphorus present without bringing about a hydrolysis of the phytin. Phytin itself was also found to hinder the precipitation of the inorganic phosphorus.

The authors have elaborated methods for estimating the inorganic phosphorus in plant and animal tissues, which eliminate the above retarding factors. For plant tissues the method consists essentially of the following: The inorganic phosphorus is extracted with a 0.2 per cent hydrochloric acid solution, then the phytin and the inorganic phosphorus are precipitated with magnesia mixture while the nucleinic acids remain in solution. The inorganic phosphorus is dissolved out from the precipitate by the aid of a nitric acid solution in alcohol, and the phytin separated from this by means of filtration. The remaining process for determining the phosphorus is the usual official method with molybdate. Where enzyms are likely to be present, phenol is employed to check their action.

For animal tissues the method utilized is as follows: "(1) Extraction with boiling ammonium sulphate solution; (2) filtration, concentration by boiling, and precipitation with magnesia mixture; (3) a gravimetric estimation of phosphorus by precipitation, first with official molybdate solution, then (4) with magnesia mixture, and finally (5) burning to the pyrophosphate. This method is equally applicable to muscle, liver, kidney, and brain."

A new sensitive reaction for nitric acid and nitrates, J. SCHMIDT and H. LUMPP (*Ber. Deut. Chem. Gesell.*, *43* (*1910*), *No. 5*, *pp. 794–797*).—A 0.1 per cent solution of di-(9.10-monoxyphenanthryl)amins in concentrated sulphuric acid is the reagent. To make the test a small fragment of the salt to be tested is added to from 2 to 3 cc. of the reagent. If nitrates are present a wine-red coloration will be obtained.

A method for the determination of amino nitrogen and its applications, D. D. VAN SLYKE (*Proc. Soc. Expt. Biol. and Med.*, *7* (*1909*), *No. 2*, *pp. 46–48*; *abs. in Chem. Abs.*, *4* (*1910*), *No. 7*, *p. 933*).—This method is based upon the known reaction of aliphatic amins with nitrous acid, $RNH_2+HNO_2=ROH+H_2O+N_2$.

The method proposed requires but little apparatus, is rapid, and is stated to be as accurate as the Dumas or Kjeldahl method. It is carried out in a 35 cc. bottle, fitted with a three hole No. 4 rubber stopper. Through the stopper pass (1) the stem of a 10 cc. burette; (2) the thick-walled capillary inlet from a cylindrical dropping funnel of 25 cc. capacity, the capillary being of 2 mm. internal diameter and reaching nearly to the bottom of the bottle; and (3) an outlet tube for gas, this being a capillary from 25 to 30 cm. high, of 1 mm. internal and from 5 to 6 mm. external diameter, with the lower end flush with the bottom of the stopper and the upper end bent in a semicircle to meet the inlet of a gas burette, and with a stopcock near the middle.

"The amino solution for analysis is placed in the burette, and a few cubic centimeters of water in the dropping funnel. Into the bottle are poured 27 cc. of a 10:3 solution of sodium nitrite followed by 7 cc. of glacial acetic acid. The

stopper is placed in position and the slight air volume left in the bottle displaced by water from the dropping funnel. The outlet tube is then closed, whereupon the nitric oxid gas formed by decomposition of the nitrous acid fills the upper part of the bottle, forcing the solution back into the funnel. When from 5 to 10 cc. of gas are thus gathered, which requires but a few seconds, the outlet is opened and the gas driven out again, washing out the remaining traces of air. This is repeated to make absolutely certain that no air remains; then the outlet is closed until a gas space of from 15 to 18 cc. has formed. The stopcock of the dropping funnel is then closed and the outlet connected with a gas burette. The amino solution is run in from the 10 cc. burette, and the bottle shaken at short intervals to hasten the evolution of gas. The latter is continued until 30 to 40 cc. more gas than the volume of nitrogen expected is in the gas burette. The cock of the dropping funnel is then opened, and all the gas from the bottle and outlet tube displaced into the gas burette. This mixture of nitric oxid and nitrogen is now run into a Hempel pipette containing a 5 per cent potassium permanganate—2.5 per cent potassium hydroxid solution, which absorbs the nitrous oxid. The pure nitrogen is then measured in the burette."

Alanin, valin, leucin, glycocoll, aspartic acid, glutaminic acid, phenylalanin, serin, oxyprolin, tyrosin, arginin, histidin, tryptophan, and guanin yield one molecule each of nitrogen. Lysin yields 2 molecules of nitrogen. Prolin, being an imino substance, does not react at all. Guanidin and its derivatives also fail entirely to react.

The method is expected to be of value for rapid analysis in identifying the amino acids, for the estimation of the amount of amino nitrogen in unknown substances, and in mixtures such as hydrolyzed protein. It has also been made the basis of a quantitative estimation of the amino acids in urine. The urea is first changed to ammonia by the action of sulphuric acid in an autoclave at 175°, the ammonia distilled off after the addition of calcium oxid, and the amino nitrogen determined in the filtrate. It is suggested that this method will be of value in indicating conditions where physiological oxidation of protein nitrogen is incomplete.

A new reaction for proteids, W. Arnold (*Abs. in Chem. Ztg., 34 (1910), No. 38, pp. 332, 333*).—A series of animal proteids gave a characteristic reaction with sodium nitroprussid and ammonia, and which was not found to be due to a splitting off of alkali sulphids.

The test is conducted as follows: To from 1 to 2 cc. of an aqueous solution of the proteid is added from 2 to 4 drops of a 4 per cent sodium nitroprussid solution and then a few drops of ammonia. In the presence of certain proteids an intense purple-red coloration will ensue.

Hydrolysis of protein, M. Pfannl (*Monatsh. Chem., 31 (1910), No. 1, pp. 81–85*).—Comparative tests made between the usual Fischer method and Przibram's alcohol-hydrochloric acid method yielded with fibroin 33.8 per cent glycocoll and 53.9 per cent volatile esters by the Fischer method, and 35.1 per cent glycocoll and 57.8 per cent volatile esters by the Przibram method. With gelatin the Przibram method yielded 10.8 per cent glycocoll and 36.7 per cent volatile esters.

A modification of Fischer's ester method, B. O. Pribram (*Monatsh. Chem., 31 (1910), No. 1, pp. 51–54*).—As a possibility exists of resaponification taking place during the salting out process with sodium carbonate, as proposed by Fischer, or with barium oxid as suggested by Levenne, the author proposes to liberate the ester by means of dry ammonia.

Casein peptones containing phosphorus, M. Dietrich (*Biochem. Ztschr., 22 (1909), No. 1–2, pp. 120–130; abs. in Milchw. Zentbl., 6 (1910), No. 1, pp. 37, 38; Jour. Chem. Soc. [London], 98 (1910), No. 567, I, p. 82*).—The calcium

compound of one of the digestion products of casein (polypetid phosphoric acids), separated by Reh's method (E. S. R., 19, p. 1108), was studied by the author and is described as a yellow-brown powder easily soluble in cold water but insoluble in alcohol, ether, and acetone.

Phosphoric acid was split off when this body was treated by either concentrated acids or dilute alkalis. By boiling the aqueous solution (1:300 or 1:400) a microscopic crystalline precipitate of the calcium salt was obtained. In higher concentrations this product was gelatinous, which indicated that a mixture of various salts was present. Much of the calcium salt was deposited on boiling a concentrated solution of the crude salt.

Phosphorus determinations were made in the precipitate and solution, respectively. After dissolving the precipitate in water and acetic acid, neutralizing, and fractionating with zinc acetate, lead acetate, and copper acetate three peptone-like bodies containing phosphorus were obtained, which differed from each other in the readiness with which they yielded inorganic phosphorus. In the original solution an acid was present which could be precipitated with uranyl acetate.

Physico-chemical investigations with lecithin and cholesterin, O. PORGES and E. NEUBAUER (*Ztschr. Chem. u. Indus. Kolloide, 5 (1909), No. 4, pp. 193–197; abs. in Zentbl. Physiol., 23 (1909), No. 24, p. 880*).—The electrolytes (in concentrations of from $\frac{n}{10,000}$ to $\frac{n}{5}$) of the alkali salts of lecithin (alcoholic lecithin solutions) show no changes, but the alkali earth salts are precipitated within 24 hours. Zinc chlorid and cadmium chlorid compounds (up to $\frac{n}{100}$) are precipitated at once. Mercuric chlorid precipitates only partly in the higher concentrations, while cadmium chlorid and manganese chlorid are only active in medium concentrations. Tartaric acid, on the other hand, has a wider range of activity. Among the nonelectrolytes, dextrose and mastic solutions produced no changes, while colloidal ferric hydrate and ferric chlorid precipitate in middle concentrations. The reactions are therefore characteristic of colloidal reactions.

About carnaubon, E. K. DUNHAM and C. A. JACOBSON (*Ztschr. Physiol. Chem., 64 (1910), No. 3–4, pp. 302–315*).—A glycerin-free phosphatid is described which simulates lecithin and has galactose as its nucleus.

Fat analysis and fat chemistry for the year 1909, W. FAHRION (*Ztschr. Angew. Chem., 23 (1910), Nos. 10, pp. 446–450; 11, pp. 490–498*).—A retrospect is given of the chief advances made in the chemistry of fats during 1909.

The examination of the volatile acids in edible fats, E. POPPE (*Abs. in Chem. Ztg., 34 (1910), No. 26, p. 222*).—The author investigated the various methods which have been introduced during the last 10 years, and concludes that the Reichert-Meissl and Wauters methods are the most reliable.

An extraction apparatus, N. ROBERTS (*Amer. Chem. Jour., 43 (1910), No. 5, pp. 418–425, figs. 2*).—An apparatus is described which can be employed for large charges, as much as 3 kg. of substance.

The simple carbohydrates and the glucosids, E. F. ARMSTRONG (*London and New York, 1910, pp. IX+112*).—The aim of this monograph is to present the more important facts which relate to the chemistry of the simple carbohydrates and glucosids, and particularly matter not available in the ordinary text-books.

As to the identity of pepsin and chymosin, W. VAN DAM (*Ztschr. Physiol. Chem., 64 (1910), No. 3–4, pp. 316–336*).—Pure pig enzym when digested with 0.2 per cent hydrochloric solution produces a solution which loses its capacity for coagulation, but is still capable of digesting large amounts of egg albumen at concentrations of 0.72×10^{-5}-n-H. On purifying a heated solution by dialy-

sis and precipitation with ammonium sulphate a solution was obtained which was absolutely identical with the unheated preparation, showing that the coagulation power was only apparently destroyed by the digestion.

It is further shown that the coagulation power of a purified enzym is inhibited to quite an extent by the hydroxyl ions in milk. Enzym digested with 0.2 per cent hydrochloric acid and heated (prepared according to Mett) was even more sensitive in this regard. Determining the coagulation time at blood heat (37° C.), as recommended by Hammersten is not a true measure of this capacity. No ground evidently exists for the supposition that both a proteolytic and a coagulating enzym exist in gastric juice.

Reversibility of enzym actions and the effect of external factors on enzyms, F. G. KOHL (*Bot. Centbl., Beihefte, 23 (1908), 1. Abt., pp. 64b–64o; abs. in Zentbl. Agr. Chem., 38 (1909), No. 10, p. 718; Jour. Chem. Soc. [London], 98 (1910), No. 567, 1, pp. 82, 83*).—It is shown that yeast extracts with a high inverting power, when acting on sucrose solutions of known concentration in the absence of light and at different temperatures, produced dextrose and levulose up to certain limits and then remained stationary, or brought about a reversion. The time factor was always dependent on the temperature and the concentration. In this work bacterial action was excluded with thymol or chloroform. Asparagin (0.05 per cent) was found to accelerate the hydrolysis, while diffused daylight retarded it.

About cellase, G. BERTRAND and M. HOLDEBER (*Bul. Soc. Chim. France, 4. ser., 7 (1910), No. 5, pp. 177–184; abs. in Chem. Ztg., 34 (1910), No. 22, p. 186*).—The authors were able to find cellase in almonds, apricot kernels, barley kernels, and *Aspergillus niger*. It was absent in horse serum, at least in appreciable amounts, in fermenting yeasts, and in a glycerin extract of *Russula queletii*. See also a previous note (E. S. R., 23, p. 8).

Food chemistry for 1909, G. FENDLER (*Ztschr. Angew. Chem., 23 (1910), No. 15, pp. 673–684*).—A retrospect of the advances made in food chemistry during 1909.

Comment on the rapid detection of food adulteration, F. ROTHÉA (*Comment Dépister Rapidement les Fraudes Alimentaires. Paris, 1910, pp. IV+286, figs. 18*).—A small handbook containing methods for food analysis, with a discussion of the most common adulterations to be considered when interpreting results.

Estimation of the purins in foods, G. BESSAU and J. SCHMID (*Ther. Monatsh., 24 (1910), No. 3, pp. 116–121; abs. in Pharm. Zentralhalle, 51 (1910), No. 14, p. 279*).—Burian and Schur's method was employed. In this the nucleo-proteids are hydrolyzed by boiling for several hours with dilute acid. After precipitating the proteins (and boiling the precipitate repeatedly to remove any remaining bases) the bases are precipitated from the solution by bisulphite-copper sulphate. The precipitate containing the bases is then decomposed with hydrogen sulphid, and after concentrating and filtering the solution they are reprecipitated with the silver reagent. The purin nitrogen is then estimated in this second precipitate. The amount of nitrogen found represents about one-third of the actual purins present.

A table appended shows that the purins in the muscle of various animal species vary very little, particularly when red and white meats are compared. The flesh of certain types of fish contains a high but varying purin content, appearing to be higher the smaller the species. Certain plants, for instance spinach, kohl-rabi, and cereals, contain appreciable amounts of purin.

A new constituent of food products, A. BACKE (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 9, pp. 540–543*).—Continuing previous work (E. S. R.,

22, p. 412), the author reports that he has isolated a new carbohydrate compound formed by caramelization and similar to maltol, which is of interest in pure food work from the fact that it gives reactions similar to certain of those of salicylic acid. See also a previous note by Sherman (E. S. R., 22, p. 611).

Analysis of lard and detecting adulteration, J. Wauters (*Abs. in Chem. Ztg., 34 (1910), No. 26, p. 222*).—The analysis includes the determination of specific gravity, refraction figure, solubility temperature in alcohol, Reichert-Meissl number, Wauters number, and iodin number. Determining the refractometric figure and the critical temperature are sufficient to detect an addition of 10 per cent of coco fat.

The nitrogenous substances in honey, R. Lund (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 1 (1910), No. 1, p. 38; abs. in Chem. Ztg., 34 (1910), No. 35, Repert., p. 141*).—The author criticises the existing methods for examining honey and draws attention to the fact that the protein (total protein and albumin) in natural and artificial honeys furnishes a good index as to their identity.

About the ferment reactions of honey, A. Auzinger (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 7, pp. 353-362*).—From the results it seems evident that the reaction obtained with paraphenylendiamin, hydrogen dioxid, and honey can not be attributed to a ferment action. Tests with various pure sugars brought out the fact that this same reaction can be obtained with fructose, showing that the test is purely chemical.

Experiments to determine the action of the various methods for diastase, catalase, and the paraphenylendiamin reactions at different temperatures, and in acid, neutral, and alkali media, were also made. See also a previous note (E. S. R., 23, p. 12).

The effect of pectin substances on sugar estimation in dry marmalades, F. Strohmer and O. Fallada (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 1, pp. 49-55*).—In estimating the sugar content of fruit conserves particular attention must be paid to the influence exerted by pectin.

The determination of the fat content of cocoa and chocolate, A. Prochnow (*Arch. Pharm., 248 (1910), No. 2, pp 81-88*).—Previously noted from another source (E. S. R., 22, p. 413).

On the quantitative determination of cane sugar by the use of invertase (*Amer. Sugar Indus. and Beet Sugar Gaz., 12 (1910), No. 5, pp. 179, 180*).—Previously noted from another source (E. S. R., 22, p. 412).

Influence of optically active substances (nonsugars) upon the sugar estimation in beets, K. Andrlík and V. Staněk (*Ztschr. Zuckerindus. Böhmen, 34 (1910), No. 7, pp. 385-399*).—Beet juice, obtained by digesting with water and clarifying with 10 cc. of lead vinegar, when concentrated to one-fifth of the original volume showed a diminution in the polarization and reducing value not due to the inversion of the sucrose. The same observation was made with press and diffusion juice, and indicates the presence of optically active substances which differ from raffinose, amino acids, etc.

The electrical conductivity method for the ash in impure sugar solutions, A. E. Lange (*Ztschr. Ver. Deut. Zuckerindus., 1910, No. 651, II, pp. 359-381*).—The author finds that the results obtained with the Main method (E. S. R., 22, p. 10) are very satisfactory, but draws attention to the fact that it is always necessary to have a series of constants at hand. A new method is therefore proposed, particularly for impure sirups, and tables for use with it are appended.

A reversion of the starch-dextrin reaction, E. T. Reichert (*Univ. Penn. Med. Bul. 23 (1910), No. 2, pp. 57-74*).—The starch-dextrin reversion reaction

was studied by a new method, which is dynamic and not enzymatic in its action, and consists in raising the temperature of the digesting solution rapidly when it has arrived at a point near or at its equilibrium. The tests were conducted with a 1 per cent starch solution and chiefly with pancreatin, although in some instances malt and taka-diastases and ptyalin were used as the enzym.

When the enzym was allowed to act upon the starch solution until a violet coloration was obtained with iodin, and then quickly heated up to 60° or 65°C., a reversion to the original blue coloration of the starch was obtained. No reversion was obtainable after the reaction had proceeded to the achro-dextrin stage, but occasionally dextrin-maltose and maltose-glucose reversions were noted with the polariscope.

The estimation of iron in milk, G. Fendler, L. Frank, and W. Stüber (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 7, pp. 369, 370*).—Evaporate 200 gm. of the milk in a platinum dish and incinerate to white ash. As often the ash still contains some carbon particles, dissolve the residue (as far as possible) in 5 cc. of hydrochloric acid (specific gravity 1.125) and extract with water. Burn the insoluble particles in the filter completely (with the filter), to the residue add the hydrochloric acid extract previously obtained, and evaporate the whole to complete dryness. Then treat the mass with 20 cc. of fuming hydrochloric acid, again evaporate to dryness, to the residue add 30 cc. of concentrated sulphuric acid, digest on the water bath, and finally heat over a burner until dense white fumes of sulphuric acid escapes. Finally dilute the residue to 110 cc. with water, filter, and take 100 cc. of the filtrate taken for the iron determination, which is made in an Erlenmeyer flask. Into the flask place a stick of zinc (around which is wound some platinum wire, the end of which is fused into a glass rod), stopper the bottle with a Bunsen vent and heat for one-half hour on the water bath, allow to cool, remove the zinc stick, and titrate with twentieth-normal potassium permanganate solution. One cc. of the permanganate solution equals 0.004 gm. ferric oxid.

The so-called "iron milks" examined by the above method, and which were obtained from cows fed iron preparations, contained from 0.0005 to 0.00079 per cent of iron oxid, while ordinary milk contained from 0.0004 to 0.0012 per cent.

Determination of sodium chlorid in milk, P. Poetschke (*Abs. in Chem. Ztg., 34 (1910), No. 31, p. 268*).—On incinerating the residue from milk according to the usual method some of the sodium chlorid is lost. The author proposes to eliminate this possibility by diluting the milk with water, adding copper sulphate, and then allowing sodium hydroxid to run in slowly in order to precipitate the proteins. The chlorin is determined according to Volhard's method.

Fat content and specific gravity of curdled milk liquefied with ammonia, O. Hofmeister (*Landbote, 1910, p. 371; abs. in Molk. Ztg. [Hildesheim], 24 (1910), No. 29, p. 532*).—The specific gravity and fat content of curdled milks which were reliquefied with ammonia were determined and the results compared with those obtained in the original fresh milk.

The formulas used for this purpose were as follows: For fat, $F=\frac{C. F_1}{A}$, where F=fat in the original milk, F_1=fat in the curdled milk liquefied with ammonia, A=the volume of the curdled milk, and C=the volume of the liquefied milk. For the specific gravity, $s=\frac{C. s_2-B. s_1}{A}$, where s=the required specific gravity of the original milk, s_1=the specific gravity of the ammonia, s_2=that of the liquefied milk, A=the volume of the curdled milk, B=that of the ammonia, and C=that of the liquefied milk.

The results obtained were very satisfactory.

Refraction and specific gravity of the calcium chlorid milk serum, C. Mai and S. Rothenfusser (*Milchw. Zentbl., 6 (1910), No. 4, pp. 146–154*).—A polemical article, continuing previous discussions (E. S. R., 20, p. 706; 21, p. 11; 22, p. 514).

The relation of the acidity to the catalytic power of fresh milk, J. Sarthou (*Jour. Pharm. et Chim., 7. ser., 1 (1910), No. 8, pp. 387–393*).—The author draws attention to the fact that no relation exists between the catalytic activity and the amount of acid present in the milk. Estimating the catalytic power, however, will determine the degree of freshness of the milk.

Diastases in milk (peroxidases), E. Nicolas (*Abs. in Chem. Ztg., 34 (1910), No. 29, p. 249*).—The author discusses Bordas and Touplain's work (E. S. R., 21, p. 475), which attributes the peroxidase reaction in milk to colloidal casein, and states that if the casein of the milk is removed with acetic acid the resulting (filtered) serum will decompose hydrogen dioxid and give the characteristic reaction with guaiacol. The coloration becomes even more intense if the colloids are removed from the milk by magnesium sulphate or sodium chlorid at a temperature of from 37° to 40° C.

If to the lactose serum from raw milk (originally treated with acetic acid) from 2 to 3 volumes of alcohol are added, a precipitate is obtained which is soluble in acetic acid and which also contains the active substance. This precipitate when washed with alcohol, rubbed up and treated with distilled water or slightly acidified water, gives up the peroxidase substance to the water and in which the characteristic reactions can be obtained. The author expresses the opinion that a soluble product exists in milk which possesses the peroxidase activity.

Milk ferments, J. Meyer (*Arb. K. Gsndhtsamt., 34 (1910), No. 1, pp. 115–121*).—From the results it appears in contradistinction to those obtained by Bordas and Touplain (E. S. R., 21, p. 475) that the sediment and cream layer from a filtered milk which has been heated for a sufficient length of time will not decompose hydrogen peroxid nor give a blue coloration with paraphenylendiamin. When the sediment liberates hydrogen peroxid this is probably due to the dirt particles contained therein, which sometimes are capable of acting as catalysts.

Tests with raw milk casein showed that while this substance was capable of decomposing hydrogen peroxid it did not bring about an oxidation of the paraphenylendiamin with hydrogen peroxid. Heated casein also did not liberate oxygen, nor did it oxidize paraphenylendiamin in the presence of hydrogen peroxid. Milk serum (obtained by filtering through a collodium ultra-filter) when rubbed up with raw casein did not give the characteristic reaction. Attempts to reactivate boiled milk with pumice stone or platin sole showed that the latter brought about an active reaction almost immediately, while pumice stone did this slowly.

Examination of condensed milk (*Pharm. Post., 43 (1910), No. 24, pp. 235, 236*).—A method employed by the treasury department (technical control) at Vienna is given.

Condensed milks usually contain sucrose (R) in addition to lactose (M) and possibly fluctuating amounts of invert sugar (I), so that G (total sugar) =R+M+I. The total sugar is determined after inversion with Fehling's solution and the result calculated as cane sugar. In a second sample the cane sugar and the invert sugar are fermented with press yeast and the remaining milk sugar determined with Fehling's solution and the findings reported as cane sugar. The difference (G—M) gives the cane sugar content.

Simplifications in milk analysis, S. H. Collins (*Proc. Univ. Durham Phil. Soc., 3 (1909-10), No. 4, pp. 191-194, fig. 1*).—The author has constructed a slide rule which, in contradistinction to the Droop Richmond apparatus, requires only one setting to obtain the results.

The refraction constant of the nonvolatile acids of butter, G. Dumitrescu and D. M. Popesu (*Abs. in Chem. Ztg., 34 (1910), No. 23, pp. 196, 197*).—The authors show that determining the refraction constant of butter furnishes an index as to the amount of nonvolatile acid present. The limits found in these tests were between 20.9 and 30.2 at 40° C. for pure Roumanian butters.

The composition of various butters, A. Reinsch (*Ber. Chem. Untersuch. Amt. Altona, 1909; abs. in Milchw. Zentbl., 6 (1910), No. 4, pp. 188-192*).—The results of determinations of the refractive index and Reichert-Meissl number of German and Russian butters for 1909 are reported.

The determination of salt in butter at the creamery, J. L. Sammis (*Wisconsin Sta. Circ. Inform. 14, p. 7, figs. 2*).—A modification of the method previously described (E. S. R., 13, p. 16).

Contributions to our knowledge of beeswax, G. Buchner (*Ztschr. Öffentl. Chem., 16 (1910), No. 7, pp. 128-131*).—Attention is called to abnormal results obtained in the analysis of genuine beeswax.

Preparation of beeswax (*Bul. Imp. Inst. [So. Kensington], 8 (1910), No. 1, pp. 23-31*).—An account of the preparation of beeswax for the market in Africa and India is given.

Vinegar from apples, F. de Castella (*Jour. Dept. Agr. Victoria, 8 (1910), No. 3, pp. 151-156*).—The feasibility of producing vinegar from apples in Australia is discussed and the processes of manufacture are described.

The home canning of fruits and vegetables, S. B. Shaw (*Bul. N. C. Dept. Agr., 31 (1910), No. 5, pp. 24, figs. 9*).—This bulletin embraces the results of experimental tests in the home canning of fruits and vegetables. The principles of canning and the necessary equipment are discussed, and specific directions are given for canning various fruits and vegetables, mixed vegetables, and soups.

Canning tomatoes on a large scale, G. S. Demuth (*Weekly Market Growers Jour., 6 (1910), No. 19, p. 5*).—A practical article in which the entire process is considered.

[The manufacture of dry tomato conserve] (*Pure Products, 6 (1910), No. 5, pp. 251-254*).—A description of a method for preparing dry tomato conserve previously noted (E. S. R., 22, p. 416).

The microflora and the preservation of French mustard, I, A. Kossowicz (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 2, pp. 95-120*).—The results show that freshly ground mustard as it leaves the mill contains bacteria and spores of the Mesentericus and Subtilis group. The decomposition of mustard is very often brought about by bacteria which are not active gas formers, but notwithstanding this, gas formers are very often present. The gas bubbles present in the fermenting mustard may also originate from two other sources, (1) from the metabolic processes of the nongas-forming bacteria, and (2) from the air absorbed by the mustard mash. An infected mustard without gas fermentation will sometimes be decomposed to a greater degree than one containing much gas. The mashing process brings about a decided decrease in the micro-organism content, the mold and budding fungi being chiefly suppressed. The addition of condiments or hydrogen peroxid and lactic acid to the mash exerts no influence on the suppression of the bacteria.

In order to prevent the spoilage of mustard it is advisable to add some white mustard seed to the mash, and to have a higher acetic acid content present,

using for this purpose garlic vinegar where advisable, to occasionally refresh the stored mustard by milling with fresh mustard and some acetic acid, to mash in thick, and finally, to keep the finished product in a cool place. Sterilizing the mustard thus far has not given good results.

Clarifying powders in sugar manufacture, J. J. HAZEWINKEL (*Meded. Proefstat. Java-Suikerindus., 1910, No. 33, pp. 299-307*).—Tests to determine the advisability of employing a clarifying powder (aluminum sulphate and sodium sulphite) in sugar manufacture are reported.

The sulphuring of wool, A. REYCHLER (*Bul. Soc. Chim. Belg., 23 (1909), No. 12, pp. 471-475; abs. in Chem. Ztg., 34 (1910), No. 25, Repert., p. 103*).—The combining of sulphurous acid with wool proceeds in two ways, namely, (1) by chemical absorption which at first is rapid, then gradually diminishes, and finally reaches a certain limit, and (2) by solution of the gaseous sulphurous acid. The author has constructed an apparatus for measuring the absorption of sulphurous acid by the wool.

Hydrolysis of cellulose with hydrofluoric acid, J. VILLE and W. MESTREZAT (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 12, pp. 783, 784*).—Hydrolyzing 100 gm. of dry cellulose with a 50 per cent solution of hydrofluoric acid yielded 41 gm. of glucose in 6 hours.

The behavior of fluorids in the preservation of wood, R. NOWOTNY (*Österr. Chem. Ztg., 13 (1910), No. 7, pp. 81-84*).—A study in reference to the behavior of zinc fluorid solution and zinc chlorid-sodium fluorid solution and of various methods in impregnation of wood.

[Miscellaneous analyses], W. P. GAMBLE (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 90-93*).—Analyses are reported of potable waters, ashes, fertilizers, bone phosphate, bone meal, potassium sulphate, ground caplin, ground kelp, limestone, and sand.

Report of the Stein analytical-chemical laboratory for 1908, F. CHRISTENSEN (*Tidsskr. Landokonomi, 1909, No. 6, pp. 329-355*).—Results of analyses of feeding stuffs, fertilizers, and dairy products are reported and discussed.

METEOROLOGY—WATER.

Bulletin of the Mount Weather Observatory (*U. S. Dept. Agr., Bul. Mount Weather Observ., 2 (1910), pts. 4, pp. 111+183-278, pls. 5, figs. 18, charts 6; 5, pp. 279-345, figs. 3, charts 6*).—These numbers contain the following articles:

Part 4.—Vertical Temperature Gradients as Modified by Seasons and by Storm Conditions (illus.), by W. J. Humphreys; Periodic Variation in the Velocity of the Centers of High and Low Pressure, by E. Gold; The Velocity of the Centers of High and Low Pressure in the United States, by C. F. von Herrmann (E. S. R., 19, p. 10); Changes of Atmospheric Density in Storms (illus.), by J. I. Craig; Pyrheliometer and Polarimeter Observations, by H. H. Kimball; Recent Building Operations at Mount Weather, Va. (illus.), by A. J. Henry; The Construction of a Weather Bureau Kite (illus.), by A. J. Henry; The New Kite Reel (illus.), by W. R. Blair; and Upper Air Data for April, May, and June, 1909 (illus.), by W. R. Blair.

Part 5.—Atmospheric Phenomena and Halley's Comet, by W. J. Humphreys; The Isothermal Layer and the Temperature of the Earth, by W. J. Humphreys; Latitude Effect on the Temperature and Height of the Upper Inversion, by W. J. Humphreys; The Atmosphere, by R. S. Woodward; Misleading Names for Winds, by C. Kassner; and Upper Air Data for July, August, and September, 1909 (illus.), by W. R. Blair.

Monthly Weather Review (*Mo. Weather Rev., 38 (1910), No. 3, pp. 329-506, figs. 18, charts 34*).—This number contains the usual climatological summaries,

weather forecasts and warnings for March, 1910, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts. There are also special papers on Average Stream Flow of the Chattahoochee and Flint Rivers in Georgia; The Work of the Water Resources Branch of the United States Geological Survey in the Ohio River Valley, by A. H. Horton; The Shoshone Reservoir, by W. S. Palmer; Water Supply for the Shoshone Project, by D. W. Cole; Smudge Pots for the Prevention of Frosts, Wichita, Kans. (illus.), by R. H. Sullivan (see p. 341); Relation of Precipitation and Stream Flow to Irrigation Projects (illus.), by D. W. Mead; Climatology of Deschutes Valley (illus.), by E. A. Beals; Water Resources of Deschutes River Drainage Basin (illus.), by J. C. Stevens; Flood in the Willamette Valley in February and March, 1910 (illus.), by H. J. Andree; The Coconino Forest Experiment Station Near Flagstaff, Ariz. (illus.), by A. E. Hackett; The Petrified Forests of Arizona (illus.), by F. H. Bigelow; Comments on Professor Swain's Article on Floods and Forests, by T. P. Roberts; and Summary of the Climatological Data for the United States, by Sections, by F. H. Bigelow.

Weather report, W. H. DAY (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 49–54*).—Observations on temperature, precipitation, length of season, wind, and damage by lightning at different places in Ontario for the year 1909 are reported.

[Meteorological observations in Trinidad] (*Ann. Rpt. Dept. Agr. Trinidad and Tobago, 1908–9, pp. 19–24*).—Tables give the annual rainfall at the Royal Botanic Gardens, 1862 to 1908; mean annual records of barometric pressure, temperature, relative humidity, and rainfall, 1888 to 1908; sunshine records, 1908; observations on barometric pressure, temperature, humidity, rainfall, etc., at St. Clair, 1908; and annual rainfall for the Island of Trinidad as shown by observations at 60 different stations.

The weather of the past agricultural year, F. J. BRODIE (*Jour. Roy. Agr. Soc. England, 70 (1909), pp. 406–414*).—The general character of the different seasons of the year is described and summaries of long-term observations on rainfall, temperature, and sunshine for the United Kingdom are given.

The weather of Scotland in 1909, A. WATT (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 305–316*).—"This report consists of (1) a general description of the weather over Scotland from month to month; (2) a selection of rainfall returns, in which each county of Scotland is represented by one or more stations."

Hailstorms and lightning strokes in Saxony, 1886 to 1905, E. GROSSMANN (*Ztschr. K. Sächs. Statis. Landesamt., 55 (1909), pp. 108–122, maps 2*).—Very complete data on this subject are given.

The rains of the Nile Basin and the Nile flood of 1908, H. G. LYONS (*Survey Dept., Egypt, Paper No. 14, pp. 69, pls. 8*).—The available data relating to the distribution of rainfall in the Nile Basin, the rainfall of 1908, the preceding low stage, and the Nile flood of 1908 are summarized and discussed, and observations indicating earth movements at Lake Victoria, are also reported.

The period of deficient rainfall which began in 1896 was broken in 1908. The improved facilities for studying this subject are described. "During 1908 rainfall was measured at 88 stations in the Nile Basin while that recorded at 118 other stations in neighboring regions was studied in connection with the meteorological conditions of northeastern Africa." Also, see a previous report (E. S. R., 22, p. 315).

Dew measurements during 1904 to 1907, N. PASSERINI (*Bol. Ist. Agr. Scandicci, 2. ser., 7 (1908), No. 2, pp. 191–204*).—Already noted from another source (E. S. R., 20, p. 615).

Surface water supply of the Ohio River basin, 1907–8, A. H. HORTON, M. R. HALL, and R. H. BOLSTER (*U. S. Geol. Survey, Water-Supply Paper No. 243, pp. 7–224, pls. 4, fig. 1*).—This publication gives the results of flow measurements in the drainage basins of the following rivers: Allegheny, Monongahela, Muskingum, Kanawha, Miami, Wabash, and Tennessee.

Surface water supply of the St. Lawrence River basin, 1907–8, H. K. BARROWS, A. H. HORTON, and R. H. BOLSTER (*U. S. Geol. Survey, Water-Supply Paper No. 244, pp. 7–163, pls. 7, fig. 1*).—This publication gives the results of flow measurements in the following drainage basins: Lakes Michigan, Huron, Erie, and Ontario, and the St. Lawrence River.

Surface water supply of the Upper Mississippi River and Hudson Bay basins, 1907–8, A. H. HORTON, E. F. CHANDLER, and R. H. BOLSTER (*U. S. Geol. Survey, Water-Supply Paper No. 245, pp. 7–133, pls. 5, fig. 1*).—The results are given of flow measurements in the drainage basins of the following rivers: St. Mary, Red, Mississippi (at Anoka, Minn.), Chippewa, Black, Wisconsin, Wapsipinicon, Rock, Iowa, Sangamon, Kaskaskia, and Big Muddy.

Surface water supply of western Gulf of Mexico, 1907–8, W. B. FREEMAN, W. A. LAMB, and R. H. BOLSTER (*U. S. Geol. Survey, Water-Supply Paper No. 248, pp. 5–171, pls. 4, fig. 1*).—The results are given of flow measurements in the Rio Grande River drainage basin.

Surface water supply of the Colorado River basin, 1907–8, W. B. FREEMAN and R. H. BOLSTER (*U. S. Geol. Survey, Water-Supply Paper No. 249, pp. 206, pls. 10*).—This publication gives the results of flow measurements in the Colorado River drainage basin.

Water supply statistics (*Ann. Rpt. Bd. Health Mass., 40 (1908), pp. 215–250*).—Data for rainfall and flow of streams in various places in Massachusetts are given.

Examination of public water supplies (*Ann. Rpt. Bd. Health Mass., 40 (1908), pp. 203–211*).—Chemical analyses of the principal sources of public water supply in Massachusetts examined during 1908 are reported.

Examination of rivers (*Ann. Rpt. Bd. Health Mass., 40 (1908), pp. 545–555*).—This is an account of the examination of sources and character of pollution of various streams in Massachusetts.

Purification of sewage, H. W. CLARK and S. DEM. GAGE (*Ann. Rpt. Bd. Health Mass., 40 (1908), pp. 253–538, dgms. 20; reprint, pp. 291, dgms. 20*).—This is a review of 21 years' experiments on the purification of sewage at the Lawrence (Mass.) Experiment Station. It summarizes the results of experiments on the composition of the sewage used; sand and soil filtration; efficiency of trickling filters; contact filters and their operation; comparative disposal of organic matter by sand, contact, and trickling filters; preliminary treatments for removal of suspended matter; disposal of sewage sludge by destructive distillation; bacteriology of sewage and sewage purification; and biochemistry of sewage purification.

Sterilization of large quantities of water by means of ultraviolet rays, V. HENRI, A. HELBRONNER, and M. DE RECKLINGHAUSEN (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 15, pp. 932–934, fig. 1; abs. in Sci. Abs., Sect. B—Elect. Engin., 13 (1910), No. 6, pp. 209, 210*).—This article describes an apparatus capable of sterilizing water at a rate of 125 cubic meters per hour. The apparatus consists essentially of a mercury vapor lamp in quartz of the Westinghouse-Cooper Hewitt type. With such a lamp, using a current of 220 volts and 3 amperes, an emulsion containing typhoid, dysenteric, and similar bacilli was

completely sterilized at a distance of 60 cm. in 30 seconds, at 40 cm. in 15 seconds, at 20 cm. in 4 seconds, and at 10 cm. in less than 1 second. The sterilization was effected by an expenditure of 3.6 watt hours per cubic meter, but it is thought that this can be considerably reduced.

SOILS—FERTILIZERS.

What is weathering? P. TREITZ (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 131–161*).—Special emphasis is laid in this article upon the controlling influence of moisture upon weathering, and soils are classified with reference to the character of the climate in which they have been formed.

The principal soil zones described are (1) those in which the precipitation is from 450 to 800 mm., (2) those with from 300 to 450 mm., and (3) those with less than 300 mm. In the first is included the moist oceanic climate in which the soil solutions are poor in bases and have an acid reaction, and the drier continental climate in which the soil solutions are rich in bases, especially lime, but are also acid. The second zone includes semiarid climate in which the soil moisture is a saline, alkaline humus solution. The third zone includes desert climate and drifting sandy soils.

In discussing weathering the author distinguishes between the surface crust of the soil particle, consisting of products of weathering, and the inner unaltered core. The former when separated from the particle and diffused through the soil forms clay. The weathered soil is a mixture of silicates resulting from the weathering process with fragments of unaltered original minerals. The weathering is more complete in humid regions than in dry regions. As regards the composition of the products of weathering, the relation of bases to acids varies slightly within each climatic zone. With a change of the climatic conditions, however, this relation varies uniformly. The acid content (silicic and humic acid) decreases with the humidity of the air, the content of bases increasing with increasing aridity. Even forest soils contain from 10 to 20 times as much bases in arid regions as in humid regions. The separation of acids as well as bases from the soil solution depends upon climatic conditions. With a decrease in the intensity of solution greater amounts of easily soluble compounds separate out.

Soil types as determined by climatic zones, E. VON CHOLNOKY (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 163–176, chart 1*).—This article deals with desert, steppe, savanna, and forest soils, and shows the relation of moisture to the character of the soil.

Classification of soils according to climates (*Terre Vaud., 2 (1910), No. 16, pp. 181–183*).—This is a review of papers by Treitz, Cholnoky, and Corasu on the relation of soils to climate.

Agrogeological field work, H. HORUSITZKY (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 193–201*).—The principal points which should receive attention in such work are stated.

What should be included in agrogeological reconnaissance and special charts? E. TIMKÓ (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 203–205*).—A brief statement of the requisites of such soil charts is given.

The preparation of agrogeological reconnaissance and special charts, W. WOLL (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 207–212*).—A brief statement.

The special value of soil analysis in intensive agriculture, E. LEPLAE (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 177–187*).—This article maintains that chemical analysis is of great value in determining

the fertilizer requirements of soils in intensive agriculture and has the advantage of being much quicker than field experiments.

The constituents of mineral soils; the analysis, classification, and principal properties of clay soils, A. ATTERBERG (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 289–301, fig. 1*).—The essential points of this article have already been noted from another source (E. S. R., 21, p. 106).

Agricultural soils, B. N. BAKER, W. B. CLARK, and E. HIRSCH (*Rpt. Conserv. Com. Md., 1908–9, pp. 74–89, pls. 2*).—The various types of soils of the Eastern Shore, southern and north central Maryland, Frederick Valley, Catoctin Mountain and Blue Ridge, Hagerstown Valley, and the Appalachian region are described and their crop adaptations explained.

The chemical composition of some [Texas soils], G. S. FRAPS (*Texas Sta. Bul. 125, pp. 6–84, figs. 12*).—In continuation of previous work (E. S. R., 19, p. 919), this bulletin reports the results of a chemical examination of soils from Angelina, Brazoria, Cameron, Cherokee, Delta, Lamar, Hidalgo, Lavaca, Montgomery, Nacogdoches, Robertson, Rusk, Webb, and Wilson counties, Texas.

The results of the chemical analyses are in many cases checked by those of pot experiments to test the actual fertility of the soils. The results are used as a basis for the discussion of essentials of crop production, physical and chemical deficiencies of soils, conservation of soil fertility, the value of chemical analysis and pot experiments in determining soil fertility, and the chemical characteristics of Texas soil types.

Nitrogen and carbon in the virgin and fallowed soils of eastern Oregon, C. E. BRADLEY (*Jour. Indus. and Engin. Chem., 2 (1910), No. 4, pp. 138, 139*).—From the data reported the conclusion is drawn "that while the percentage of nitrogen in these soils has remained practically constant under continual cropping for, in extreme cases, 25 years, there has been a marked decrease in the carbon or organic content."

[Soils of Trinidad], P. CARMODY (*Ann. Rpt. Dept. Agr. Trinidad and Tobago, 1908–9, pp. 41, 47*).—The general character of the soils of Trinidad is described, and analyses with comments are given of an exceptionally rich humus soil obtained from an old lagoon and of a soil on which sugar cane blighted badly. The first was found to be unusually rich in phosphates and organic matter and poor in lime. It also contained a large amount of chlorin in the subsoil. The soil on which sugar cane blighted was found to contain an excess of magnesia over lime.

Analyses of soils of the Palazzo farm in Corticella, near Bologna, in the experimental field for tile draining, I. GIGLIOLI (*Bol. Min. Agr., Indus. e Com. [Rome], 8 (1909), Ser. C, No. 11, pp. 28–30, pls. 10*).—The results of analyses of 11 samples of soils taken at different depths and at different points in the field are reported and discussed.

Agronomic chart work in Bohemia, J. KOPECKY (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 213–217*).—A brief description is given of the work done under government auspices.

Soil properties of the Körös flood region, H. UJJ (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 245, 246*).—The injurious effect of excessive water in these soils is explained.

Soil zones of Roumania, G. MUNTEANU-MURGOCI (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 313–325, pl. 1*).—The principal soil zones are briefly described.

Soil conditions in Norway, K. O. BJÖRLYKKE (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 115–122*).—This article briefly discusses the geological and agronomic classification and petrography of Norwegian soils.

Soil zones and soil types of European and Asiatic Russia, K. GLINKA (*Compt. Rend. Conf. Internat. Agrogéol.* [*Budapest*], *1* (*1909*), *pp. 95–113 pl. 1*).—The most important and extensive soil zones, viz, podzol, chernozem, chestnut colored, and semidesert, and various modifications of these soils, are described, with analyses of typical samples and notes on their distribution.

Soil temperatures in the Black Forest, Graubünden, and Egypt, J. KOENIGSBERGER, E. THOMA, and F. LEIER (*Ber. Naturf. Gesell. Freiburg, 18* (*1910*), *No. 1, pp. 23–42, pls. 3, fig. 1*).—The general conclusion from the data here summarized is that in dry sandy soils the temperature at the surface is about 1.5 to 2° C. higher than that of the air, but that this difference does not exceed 1° in unforested soils in very humid climates.

The nature of the color of black cotton soil, H. E. ANNETT (*Mem. Dept. Agr. India, Chem. Ser., 1* (*1910*), *No. 9, pp. 185–203*).—It is stated that the black cotton soil of India covers at least 200,000 square miles and is the second in importance of all Indian soils, since in addition to a variety of other crops by far the largest proportion of the Indian cotton is grown on this soil. While varying in color from deep black to a slaty gray the typical soil is deep black and has an excessive tendency to crack during dry weather.

Various investigations have previously been made with reference to explaining these properties, but without very definite results. The author is of the opinion that the soil is formed in situ from trap rock. His investigations led to the conclusion that "the black color of these soils is mainly due to the presence of several per cent of titaniferous magnetite and of 1 to 2 per cent of soluble humus. The mineral substance alone would not account for the deep black color. Here it may be noted that the black color of certain Hawaiian soils is in part attributed to mineral matter, in this case manganese dioxid. The soils are not rich in organic matter judged from the European standard, and organic nitrogenous manures appear to give good results on them. The amount of clay is exceptionally high and this accounts for the 'cracking' which takes place in these soils during the hot dry weather."

Observations on the influence of the autumn plowing of the soil under summer cereals at the Poltava Experiment Station, S. T. TRETYAKOV (*Khozyaistvo, 1909, No. 7; abs. in Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *10* (*1909*), *No. 4, pp. 540, 541*).—Observations during 11 years (1895 to 1905) clearly show that in the region of the Poltava Experiment Station the earlier the field is plowed in the fall for summer wheat the greater the yield and that the earliest plowing in the fall may be only 3½ in. deep provided the field is later plowed again to a depth of about 8 in.

Three years' experiments with barley showed that it is influenced by the time of the fall plowing in the same way as wheat, but in a greater degree, being more benefited by early plowing than is wheat. Plowing in the fall and leaving the harrowing until spring resulted in lower yields than where early harrowing followed the plowing.

Effect of steam sterilization on the water-soluble matter in soils, T. L. LYON and J. A. BIZZELL (*New York Cornell Sta. Bul. 275, pp. 129–155, figs. 12*).—This bulletin summarizes the results of experiments by other investigators on the effect on soils of complete or partial sterilization by heat or volatile antiseptics, and reports studies by the authors of the chemical changes brought about by steaming garden soils in an autoclave under a pressure of 2 atmospheres for from 2 to 4 hours.

"Both the steamed and the unsteamed soils were allowed to stand in the greenhouse in pots without being planted to any crop, the surface being covered with filter paper, and by the addition of distilled water the moisture content was maintained at about 25 per cent of dry soil. No special precaution

was taken to prevent inoculation except from other soils. The number of bacteria in the sterilized soil increased to an enormous number in the course of several months, but as there was practically no increase in nitrates it is evident that either nitrifying bacteria did not enter the soil or that their growth was inhibited."

Among the more important new facts brought to light by these experiments are the following:

"Steaming the soil at 2 atmospheres pressure for 2 hours or 4 hours reduces the nitrates of the soil to nitrites and to ammonia, but most of the ammonia is formed from organic nitrogen.

"On standing for various periods up to 3 months, without plants growing on them, the steamed soils steadily decreased in their content of soluble matter, including ammonia and nitrogenous organic matter.

"Ammonification as well as nitrification (the latter mentioned by Deherain and De Moussy) were practically nonexistent during the 3 months following steaming.

"The time required for the soils to recover from the injurious effects of steaming, as shown by the better growth on the steamed than on the unsteamed soils, was with one exception in the order of their relative productiveness.

"Wheat seedlings grown in the aqueous extract of the freshly steamed soil grow less well than those in the extract of the unsteamed soil, but when the extracts were diluted the better growth was made by the seedlings in the extract of the steamed soil. The results indicate the production of injurious substances during the steaming process.

"Steamed soil on which wheat was grown for 3 months contained decidedly more soluble matter at the end of that time than did that portion of the soil on which no plants were grown, but which stood for the same length of time under similar conditions.

"The growth of wheat plants on the steamed soil served to hasten its recovery from the injurious effects of steaming.

"The effect of adding an infusion of unsterilized soil to the same soil steamed was to increase greatly the germination of seeds and the early growth of the plants, but to retard later growth, so that the second crop was very much smaller on the steamed soil to which the infusion had been added than on the steamed soil not so treated.

"Another effect of the infusion was to hasten the disappearance of total water-soluble matter, but it did not increase nitrification nor did it apparently increase ammonification, at least when plants were not growing on the soil."

On the biochemical cycle of phosphoric acid in cultivated soils, R. Perotti (*Sul Ciclo Biochimico dell' Anidride Fosforica nel Terreno Agrario. Rome, 1909, pp. VII+231, pls. 2, figs. 15; Staz. Sper. Agr. Ital., 42 (1909), No. 8, pp. 537–552; Centbl. Bakt.* [etc.], *2. Abt., 25 (1909), No. 14–18, pp. 409–419*).—The author claims to have established the following facts:

In soils in which micro-organic processes are at work many bacteria exist which are able, under favorable conditions, to decompose phosphoric acid. The presence of carbohydrates in the culture media had a marked influence on bacterial solution phenomena, especially when a 2 per cent solution of cane sugar was used. The sources of the nitrogen in the bacterial cultures had a great influence on the ability of the bacteria to decompose the phosphoric acid; the ammonium salts in general, which are physiologically acid, favored them to a noteworthy degree, both as to intensity and duration of the action. This was especially true of the sulphate and chlorid of ammonium. The influence of the bases varied with the nature of the elements and the form of combination, but

when present in soluble form they prevented the bacterial decomposition of the phosphoric acid.

The successive steps in the solution or decomposition of the phosphoric acid in bacterial cultures were as follows: (1) Generation of acids, (2) secondary reactions in the solution, and (3) production of a soluble phosphorus-containing organic substance. The first two of these are the results of the activity of the bacteria on the phosphoric acid, and the last is due to the metabolic assimilation of the micro organisms.

Bacterial activity as a corrosive influence in the soil, R. H. Gaines (*Jour. Indus. and Engin. Chem., 2 (1910), No. 4, pp. 128-130*).—From an examination of samples of rust collected from pits in the outside and tubercles on the inside of steel conduits in different parts of the country, the conclusion is reached "that the corrosion of underground iron and steel structures is in part due to bacterial activity: (1) Directly, or by the attack of a specific microbe; (2) indirectly, or by creating acid conditions in the soil. Certain bacteria present, owing to peculiar modes of absorption and elimination of sulphur and its compounds, convert harmless substances into corrosive acids.

"The remedies proposed are: (1) Free drainage. quickly carrying off the acid solutions formed, should arrest or prevent destructive action; (2) in localities or situations where drainage is impracticable, slack lime should be packed about the metal, to neutralize acids formed as a result of bacterial activity."

Legume bacteria, S. F. Edwards (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 131, 132*).—About 2,000 cultures of legume bacteria were distributed to farmers during 1909, and of 372 reports received giving the results of their experiments, 56.7 per cent stated that benefit had been derived from the use of the cultures.

Methods of legume inoculation, K. F. Kellerman (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 63, pp. 5*).—This circular briefly points out the futility of inoculating nonleguminous crops and gives directions for the soil transfer and pure-culture methods of legume inoculation.

A contribution to our knowledge of the nitrogen problem under dry farming, F. J. Alway and R. S. Trumbull (*Jour. Indus. and Engin. Chem., 2 (1910), No. 4, pp. 135-138*).—See an article previously noted (E. S. R., 22, p. 221).

The fertilizing influence of sunlight, E. J. Russell (*Nature [London], 83 (1910), No. 2113, p. 249*).—Referring to a previous note by Fletcher (E. S. R., 23, p. 222), the author questions whether the results obtained in experiments on partial sterilization can be explained on the basis of the occurrence of toxic substances in the soil as suggested by Fletcher.

Soils and their fertility, J. H. Pettit (*Successful Farming, 9 (1910), Nos. 3, pp. 46, 47, fig. 1; 4, pp. 34-37, figs. 2; 6, pp. 26, 34, figs. 2*).—A general popular discussion of the subject.

In what does the fertility or sterility of the soil consist? J. Massart et al. (*Bul. Soc. Cent. Forest. Belg., 16 (1909), No. 8, pp. 453-465, pls. 6*).—This is a discussion of the theory of soil fertility of the Bureau of Soils of this Department.

The principles of maintaining soil fertility, M. F. Miller (*Missouri Sta. Circ. 38, pp. 17-48, figs. 6*).—This discussion, which applies particularly to Missouri soils, deals with composition, deterioration, and improvement of soils, and more particularly with the use of various rotations and systems of cropping, live stock, manures, and fertilizers in maintaining soil fertility. A system of cropping for average soils in Missouri is suggested.

Soils and manures, J. A. MURRAY (*London, 1910, pp. XIII+354, figs. 33*).—This book attempts to present the fundamental facts and principles of soil fertility and treats the subject from the scientific point of view. Some previous knowledge of chemistry is considered necessary to its proper understanding.

"The facts and figures selected to illustrate established principles have been chosen, as far as possible, from the Rothamsted records, partly on account of their recognized reliability and partly, also, because these classic researches are likely to prove of greater interest to English students than others which have been carried out abroad."

Different chapters deal with the origin of soils, physical properties of soils, chemistry of soils, biology of soils, fertility, principles of manuring, phosphatic manures, phospho-nitrogenous manures, nitrogenous manures, potash manures, compound and miscellaneous manures, general manures, and farmyard manure. Appendixes give instructions for valuing manures issued by the Highland and Agricultural Society of Scotland and the estimated manurial value of the commoner kinds of feeding stuffs.

Plain talks on the use of fertilizers, E. B. VOORHEES (*Farmers Digest, 4 (1910), Nos. 1, p. 6; 2, p. 6*).—This is a continuation of the article on this subject already noted (E. S. R., 22, p. 430).

Farm practice in the use of commercial fertilizers in the South Atlantic States, J. C. BEAVERS (*U. S. Dept. Agr., Farmers' Bul. 398, pp. 24, figs. 2*).—According to this publication, there is a lack of accurate information regarding the economic use of fertilizers, and "with a good rotation, deep and thorough tillage, and the use of green manures, legumes, and winter cover crops, the quantity of commercial fertilizers required for a given crop yield can be considerably reduced.

"The character of the soil has a marked influence on the quantity and kind of fertilizer it is necessary to use in a good system of farming.

"In farm practice there is a gradual increase in the quantity of all the fertilizer constituents required to produce like yields as the proportion of sand in the surface and subsoil increases. The increase is greatest in the quantity of potash necessary, followed by phosphoric acid, and then by nitrogen.

"A study of farm practice shows that the best farmers . . . obtain yields of 1 to 2 bales of cotton, 40 to 75 bu. of corn, and 40 to 75 bu. of oats on soils where [poorer] farmers . . . get but one-half to 1 bale of cotton, 15 to 40 bu. of corn, and 15 to 40 bu. of oats, due to the fact that the best farmers have a better understanding of the use of fertilizers and employ better farm methods.

"One of the most common grades of fertilizer on the market in the South Atlantic States at present contains 8 per cent of phosphoric acid, 3 per cent of ammonia, and 3 per cent of potash. This grade of fertilizer is of primary value only for cotton on red clay soil under fairly good methods of rotation. This fertilizer formula needs to be greatly modified for crops on sandy, sandy loam, and gray loam soils, and for all crops other than cotton on red clay soil.

"Detailed suggestions are contained in this bulletin on the best method of fertilizing and the most profitable kinds of fertilizer constituents to apply on soils of different character to cotton, corn, oats, wheat, and cowpeas."

Pot culture experiments, 1908, J. A. VOELCKER (*Jour. Roy. Agr. Soc. England, 70 (1909), pp. 388–395*).—The subjects of these experiments were the influence of lithium and potassium salts on wheat, the influence of colloid substances on the productiveness of soils, the influence of magnesia in soils, fertilizers for fen soils, continuous culture of barley on an acid soil, and inoculation of leguminous crops.

Continuing the experiments of previous years with lithium and potassium salts it was found that the former were injurious to wheat plants, the carbonate

showing the most marked effect in this respect and the nitrate being least injurious. A slight tendency in the same direction was observed with potassium carbonate, but with none of the other salts of potash. With even as little as 0.00375 parts of lithium in 100 parts of soil a harmful effect on the wheat crop was observed.

In connection with experiments with green manures, tests were made of the effect of adding colloid substances like aluminum silicate, sodium silicate, kaolin, lime, and magnesia. It was found that the addition of aluminum silicate resulted in a large increase in crop on soils green manured with tares and mustard. A less increase was observed with sodium silicate, and no effect with kaolin. The increase is attributed to the improved physical condition of the soil resulting in larger retention of moisture.

The experiments with magnesia showed that the use of this substance in the form of sulphate is not beneficial, but that it may be used with benefit in insoluble forms so long as the percentage of magnesia in the soil does not exceed that of lime.

The experiments on fen soils indicated that such soils are benefited by general manuring with mineral and nitrogenous fertilizers in spite of the fact that the soils are already rich in nitrogen.

In experiments with barley grown continuously iron sulphate, copper sulphate, and pyrogallic acid proved of no value in correcting the acidity produced in the soil by continuous use of ammonium sulphate. The yield was increased by the use of 0.1 per cent of animal charcoal, but the nature of the action of this substance was not made clear.

Slight increases in the yield of white, mammoth, and red clover, and alfalfa resulted from inoculation with nitro-bacterine.

Some secondary actions of manures upon the soil, A. D. HALL (*Jour. Roy. Agr. Soc. England, 70 (1909), pp. 12–35*).—On the basis mainly of experiments carried on at Woburn and at Rothamsted the author draws the following conclusions:

"The long-continued use of sulphate of ammonia on soils poor in lime results in the soils becoming acid.

"The acidity is caused by certain micro-fungi in the soil which split up the sulphate of ammonia in order to obtain the ammonia, and thereby set free sulphuric acid.

"The infertility of such soils is due to the way all the regular bacterial changes in the soil are suspended by the acidity; instead fungi permeate the soil and seize upon the manure.

"The remedy, as may be seen upon the Woburn plats, is the use of sufficient lime to keep the soil neutral.

"From the Rothamsted soils carbonate of lime is being washed out at the rate of 800 to 1,000 lbs. per acre per annum, the losses being increased by the use of sulphate of ammonia, but lessened by dung or nitrate of soda.

"Nitrate of soda, when applied to heavy soils in large quantities, destroys their texture.

"Some of the nitrate of soda gets converted into carbonate of soda by the action of plants and bacteria, and carbonate of soda, by deflocculating the clay particles, destroys the tilth.

"The best remedies are the use of soot or superphosphate; the best preventive is the use of a mixture of nitrate of soda and sulphate of ammonia instead of either separately.

"Soluble potash manures and common salt may also injure the tilth of heavy soils through the production of a little soluble alkali by interaction with car-

bonate of lime in the soil. The remedy is to apply such manures in the winter or in conjunction with superphosphate."

On the efficacy of soluble fertilizer salts in dry climates, S. DE GRAZIA (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 3 (1909), pp. 157–186; Staz. Sper. Agr. Ital., 43 (1910), No. 1, pp. 49–78*).—Pot experiments with sodium nitrate, ammonium sulphate, potassium chlorid, and potassium sulphate led to the conclusion that all four salts in varied amounts and under different moisture conditions gave, in the majority of cases, an increased product; this increase varied directly with the amount used in the case of the nitrogenous salts.

Field experiments at Portici in 1902–3 with the same salts and also with pure sodium nitrate, near Naples in 1904–5 with the four salts named above, and near Rome in 1906–7 with the same salts and in 1907–8 with calcium cyanamid (Frank and Polzenius process), ammonium sulphate, and sodium nitrate are reported. In general it was found that none of the salts had any injurious effect even when used in amounts larger than in ordinary farm practice.

The distribution of the manure values of foods between dung and urine, C. CROWTHER (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 125–142*).—The conclusion reached from this study is that "the distribution between the dung and urine of the manurial ingredients of foods consumed by fattening bullocks may be approximately estimated if, after deducting from the total supply of nitrogen, phosphoric acid, and potash in the food the amounts retained in the fattening increase produced by it, the rest be so distributed that the urine is credited with the remaining digestible nitrogen and 85 per cent of the potash, whilst the dung receives the rest of the potash, the undigested nitrogen, and the phosphoric acid."

Estimating the manurial value of various feeding stuffs on this basis, the conclusion is reached that if the cereal straws be excluded and also rice meal, "which, owing to its comparative richness in phosphoric acid and indigestible nitrogen, occupies an exceptional position, it will be found that on the average of all the foods . . . practically four-fifths (79.7 per cent) of the total 'original manure value' is contained in the urine, and only the remaining one-fifth in the dung." These estimates indicate "that under the conditions of the average farm, where the food stuffs will be consumed by several different classes of stock, the total liquid excreta as they leave the animals will possess from three to four times the manurial value of the total solid excrements, so far as these manurial values are determined by the chemical composition of the excreta."

As regards the losses occurring under different conditions, it is stated that "the 'original manure values' are probably most nearly attained in the case of dung and urine voided by the animals in the field, although even then the full value will not be recovered owing to uneven distribution and exposure of the dung to the drying influences of sun and wind.

"Theoretical considerations would seem to indicate that in the case of the foods consumed under cover the fertilizing ingredients will be conserved to the greatest extent when all the urine is collected separately. Almost insuperable difficulties in connection with the storage and distribution of the urine render this impossible in practice, however, and much of the urine must for these reasons be incorporated in the farmyard manure."

This subject has been fully discussed by Hall and Voelcker (E. S. R., 14, p. 1057).

Experiments on the decomposition of stable manure and on its action as a fertilizer, III, B. SJOLLEMA and J. C. DE RUIJTER DE WILDT (*Verslag. Landbouwk. Onderzoek. Rijkslandbouwproefstat. [Netherlands], 1910, No. 7, pp. 106–146, fig. 1*).—The experiments here reported are a continuation of work previously noted (E. S. R., 20, p. 721). As in the former investigations, these

experiments dealt with the influence of temperature and of air on the formation and volatilization of ammonia and on the loss of free nitrogen and also included a study of the decomposition of nitrogen compounds.

It is the opinion of the authors that the most of the conclusions drawn from the former experiments have been confirmed or at least not contradicted by the results of the present investigation, viz, that stable manure fermented under anaerobic conditions at a high temperature gave the best results, no loss of nitrogen taking place either as ammonia or in the free state; also that the ammonia content of the manure was not a reliable measure of its action on the plant. The question of what part the fermentation of the pentosans (furfuroids) play in the action of stable manure requires additional investigation. The after effect of stable manure, as in the previous experiments, was found to be small; the fresh stable manure showed the most, and that fermented at a high temperature the least, after effect.

Experiments with green manures, BAESSLER (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 18, pp. 263–267*).—A series of experiments to determine the relative efficiency as green manures of serradella furnishing 155 kg. of nitrogen per hectare (138.35 lbs. per acre) and lupines furnishing 208 kg. of nitrogen per hectare (185.65 lbs. per acre) during three successive years is reported. The crop succession with the serradella was oats the first year and winter rye the second and third years; with lupines, potatoes the first year and winter rye the second and third years.

With both green manures there was a decided increase in yield on poor sandy soils. The effect of the manures was most marked the first year. The results were slightly better with lupines than with serradella the second year, but were about equal the third year. Green manuring in the fall gave better results than spring green manuring in the case of lupines, but the difference was less pronounced with serradella. There was little or no difference on the average between deep and shallow plowing under of the green manure. With shallow fall green manuring, about 31 per cent of the nitrogen was utilized by crops, and a slightly smaller percentage with deep plowing under of the manure. The utilization was slightly better for fall than for spring green manuring.

As compared with nitrate of soda, taken as 100, the utilization of the nitrogen of the green manure was on the average for the first year 48.2 per cent, the second year 10.1 per cent, and the third year 2.6 per cent. The incidental effect of the green manures in improving soil conditions was quite marked the first year, still pronounced the second year, but small the third year after application.

On the time that should elapse between the turning under of green manure and the sowing of the cultivated plants, S. DE GRAZIA (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 3 (1909), pp. 33–37*).—The results of trials in 1907–8 with flax and wheat and in 1908–9 with fodder corn are reported. The green manures used were barley and rye and beans and vetch. In the first year intervals of 0, 10, 25, and 40 days were compared and in the second 0 and 24 days.

The flax was much less influenced by a difference in the interval than was the wheat. The results with fodder corn were not conclusive.

On the selection of plants for green manure, S. DE GRAZIA (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 3 (1909), pp. 39–41*).—A crucifer and a number of legumes were compared, but the only definite conclusion drawn is that the crucifer showed itself equal to and in several cases superior to the legumes.

Raw phosphate and green manure, S. DE GRAZIA (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 3 (1909), pp. 37–39*).—This is a continuation of work previously noted (E. S. R., 21, p. 25).

In the year's work reported, cruciferæ were compared with legumes as green manures in conjunction with raw phosphate, superphosphate, and slag. In spite of individual variations it is concluded that pulverized raw phosphates show notable efficacy especially when combined with green manure from plants capable of assimilating insoluble phosphates.

The cost of available nitrogen, E. B. VOORHEES (*Jour. Indus. and Engin. Chem., 2 (1910), No. 4, pp. 153–155*).—See a previous note (E. S. R., 22, p. 620).

Tests of the fertilizing value of synthetic calcium nitrate, N. PASSERINI (*Bol. Ist. Agr. Scandicci, 2. ser., 7 (1908), No. 2, pp. 205–209*).—Already noted from another source (E. S. R., 20, p. 723).

Some established facts regarding the natural changes in cyanamid nitrogen in the soil and their application in farm fertilization, R. PEROTTI (*Staz. Sper. Agr. Ital., 42 (1909), No. 8, pp. 521–536; abs. in Chem. Zentbl., 1909, II, No. 21, p. 1818*).—The first fact which the author regards as definitely established is that nitrogen in the form of cyanamid is poisonous to plants; next, that the poisonous cyanamid nitrogen is, by means of certain agencies in the soil, rendered harmless to vegetation and of fertilizing value; next, that micro-organisms have a part, though perhaps indirectly, in these changes, and that through their action as well as through physical and chemical changes cyanamid nitrogen is converted into ammoniacal nitrogen, the formation of urea being an intermediate step; next, that dicyandiamid is not strongly poisonous and in certain conditions can serve as a source of nitrogen for micro-organisms and for plants; and finally, that the opportunity exists to fix definitely, with further studies, a method of combining calcium cyanamid with other substances to form a satisfactory fertilizer.

The manufacture of nitric acid from the air, F. HABER (*Ztschr. Angew. Chem., 23 (1910), No. 15, pp. 684–689*).—This article discusses the principles upon which various commercial processes for the manufacture of nitric acid from the air are based.

The fixation of atmospheric nitrogen by the electric arc (*Rev. Électrochim. et Electrométal., 4 (1910), No. 3, pp. 42–44, figs. 2*).—This is an account of the first factory established in France (Roche de Rame) for the manufacture of nitrates from the air by the Pauling process.

The great nitrate deposits of Chile (*An. Soc. Rural Argentina, 44 (1910), No. 67, pp. 3–10, figs. 7*).—These deposits as well as the methods of their exploitation are described.

[Production, exportation, and consumption of nitrate of soda in 1909], C. OTERO (*Asoc. Sal. Propaganda, Circ. Trimest. 50, 1910, pp. II, III*).—According to this report of the Nitrate of Soda Propaganda the production of nitrate in Chile in 1909 was about 2,326,646 tons as compared with 2,172,356 tons in 1908; the exportation in 1909 was 2,352,006 tons as compared with 2,260,493 tons in 1908; the consumption in 1909 was 2,255,301 tons as compared with 2,024,121 tons in 1908.

Fertilizer experiments with different kinds of Thomas slag, B. SJOLLEMA and J. C. DE RUIJTER DE WILDT (*Verslag. Landbouwk. Onderzoek. Rijkslandbouwproefstat. [Netherlands], 1910, No. 7, pp. 1–25, fig. 1*).—The pot and cylinder experiments with oats followed by mustard here reported were undertaken to determine whether the Wagner citric acid method gives an accurate measure of the fertilizing value of different kinds of Thomas slag.

No direct agreement between the results obtained by the Wagner method and in the pot and cylinder tests was observed, and in many cases the residue from the citric acid treatment was as effective as the original slag. Some of the slags, which were mainly of Belgian origin, were more effective than superphosphate. The results with mustard following the oats showed that there was a decided residual effect of both the slag and the superphosphate the second year after application.

Basic slag as a fertilizer, W. L. WHITEHOUSE (*Amer. Fert.*, *32* (*1910*), *No. 9*, *pp. 7–9*).—The composition and fertilizing value of basic slag are briefly discussed, the action of the iron, manganese, and magnesia in the slag as well as of the lime and phosphoric acid being explained.

After effects of certain phosphates on limed and unlimed land, H. J. WHEELER (*Jour. Indus. and Engin. Chem.*, *2* (*1910*), *No. 4*, *pp. 133–135*).—Experiments extending over several years at the Rhode Island Experiment Station are reported which show that liming was as a rule beneficial in connection with all phosphates used except floats, although there were wide variations with different kinds of plants. The phosphates experimented with included dissolved boneblack, dissolved bone, acid phosphate, fine ground steamed bone, basic slag, raw and roasted iron and aluminum phosphate, double superphosphate, and floats.

"The wide differences in yield shown upon the several plats, when the results are compared with those where no phosphate had been used, show that the after effect of floats, bone meal, basic slag meal, and of all of the superphosphates, is great, and long-continued, both on the limed and unlimed land. . . .

"Notwithstanding that the floats had been drawn upon less heavily in previous years, by virtue of smaller crops, than most of the other phosphates, they proved far less efficient on the limed land than any of the others excepting the raw iron and aluminum phosphate which showed a negative value. On the unlimed land they gave, however, a better result than the dissolved boneblack, double superphosphate, or roasted iron and aluminum phosphate, and they proved essentially as efficient as the acid phosphate."

The mining of phosphate in Micronesia, BADERMANN (*Ztschr. Angew. Chem.*, *23* (*1910*), *No. 14*, *pp. 642, 643*).—The exploitation of important deposits on Nauru and Palau and other islands of this group is described.

Phosphate deposits of South Carolina and New Brunswick, G. F. MATTHEW (*Bul. Nat. Hist. Soc. New Brunswick*, *6* (*1909*), *No. 2*, *pp. 121–126*).—An account is given of an examination of a phosphate mine on the Stono River in South Carolina, with brief notes on a few small phosphate deposits which occur in New Brunswick. The importance of phosphate from an agricultural standpoint is briefly discussed.

An effect of drainage, BIÉLER-CHATELAN (*Compt. Rend. Acad. Sci.* [*Paris*], *150* (*1910*), *No. 14*, *pp. 884–886*).—Attention is called in this article to experiments on two soils of similar origin and character in which potash fertilizers produced a greater increase of yield on the soil richest in total and available potash. This anomalous result is attributed to the fact that the drainage was defective in the case of the poorer soil and therefore the physical conditions were not favorable for the most beneficial effects of the potash fertilizer.

Field experiments with phonolite and the relation of this fertilizer to plant diseases, K. BRÖMME (*Deut. Landw. Presse*, *37* (*1910*), *No. 30*, *pp. 334–336*).—A number of tests of phonolite and other potash fertilizers on different crops with varying results are reported. The author is of the opinion that the silicate may play an important rôle in lessening leaf curl of potatoes and grapes.

Phonolite as a potash fertilizer in Sweden, S. RHODIN (*Deut. Landw. Presse, 37 (1910), No. 27, p. 302*).—The phonolite had little or no effect on meadows, potatoes, and sugar beets.

Determination of the physiological action of lime in vineyard soils, P. TREITZ (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 273–287*).—This article deals with the relative value of different forms of lime in the soil, and brings out the fact that the physiological action is not determined by the quantity of lime in the soil as a whole, but depends upon the character of the fine earth.

Lime for Virginia farms, W. B. ELLETT (*Virginia Sta. Bul. 187, pp. 3–47, figs. 23*).—This bulletin discusses the general principles of liming, methods which may be profitably employed under Virginia conditions, methods of constructing limekilns and burning lime, machinery for crushing limestone and applying lime, available sources of supply, and related matters.

It is stated that "liming should be practiced only in connection with a rotation of crops and system of farming that returns humus to the land," and its most general use is to promote the growth of leguminous plants.

"The most striking results from liming Virginia soils, in all sections of the State, will usually be secured when preparing the land for grasses and clovers. . . . Generally speaking, the sandy soils of the Coastal Plain, or Tidewater, are benefited more by liming than any other soils of the State. . . . The heavy red clay soils of the Piedmont are usually somewhat deficient in lime and respond profitably to its application. In the valley and southwest, most of the soils are of limestone origin and contain sufficient lime, but the surface layer of some of these soils has been depleted of lime, due to leaching and to the method of farming, and liming will often give satisfactory results. In all sections of the State there are areas of greater or less extent that show little or no benefit from liming. Whether to use lime or not, therefore, must always be a local problem, and each farmer must determine it for himself."

Fine-ground limestone or shells are considered "fully as valuable as burnt lime when used at the rate of 100 lbs. of finely ground limestone or shells, as equal to 56 lbs. of fresh burnt lime," the deciding factor being the relative first cost.

The text of a state law enacted in 1910 to regulate the sale and purity of agricultural lime is appended.

[Jelly fish as a fertilizer], P. CARMODY (*Ann. Rpt. Dept. Agr. Trinidad and Tobago, 1908–9, p. 40*).—An analysis of jelly fish is reported as follows: Water 98.950 per cent, organic matter 1.004 per cent, ash 0.046 per cent. The organic matter contained 0.154 per cent of nitrogen and the ash contained a trace of potash and 0.006 per cent of phosphoric acid. The dry matter consisted principally of protein.

Report of the commission of investigation on the disposal and use of mud from the harbor of Delfzijl, F. B. LÖHNIS ET AL. (*Verslag. en Meded. Dir. Landb., Dept. Landb., Nijv. en Handel, 1910, No. 1, pp. 7–67, pls. 2, figs. 3*).—The report includes a discussion of the use of sea mud in the Netherlands and in East Friesland; its less extensive use in the Netherlands is ascribed to lack of facilities for storing and selling the dried product. The commission is of the opinion that the mud dredged from the harbor of Delfzijl may be profitably used for agricultural purposes to take the place of muck, which is becoming less available.

Fertilizers, J. HENDRICK (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 118–122*).—Analyses of miscellaneous materials are reported and commented upon, these including bone manures, dissolved bones, lawn-sand manure, lime, gas lime, sewage sludge, and wool factory waste.

The sample of gas lime reported upon contained 45.4 per cent of calcium carbonate, 8.9 per cent of calcium sulphid, and 2.3 per cent of calcium sulphate, besides 6.2 per cent of lime in other forms. It is stated that the percentage of calcium sulphid, which is the chief poisonous ingredient in gas lime, is not considered very high in this sample. The two samples of sewage sludge analyzed showed respectively 1.91 and 1.05 per cent of calcium phosphate, 0.08 and 0.04 per cent of potash, and 0.75 and 1.72 per cent of nitrogen. One of the samples contained 12.55 per cent of lime in other forms than that of phosphate. The wool waste contained 0.25 per cent of calcium phosphate, 0.11 per cent of potash, and 3.97 per cent of nitrogen.

[Soils and fertilizers], J. A. VOELCKER (*Jour. Roy. Agr. Soc. England, 70 (1909), pp. 348–351*).—Analyses are reported of samples of dissolved bone, kainit, rape meal, soot, lime, tanyard refuse, and road scrapings, and of soils containing an excess of magnesia over lime.

Inspection and analyses of commercial fertilizers, season 1909–10, W. F. HAND ET AL. (*Mississippi Sta. Circ. 31, pp. 4–33*).—This circular contains analyses and valuations of 199 samples of fertilizers collected during the season of 1909–10. It also contains a warning against patented formulas for fertilizers and explains how purchasers may recover damages for fertilizers which do not conform to the guaranty.

Analyses of fertilizers—fall season, 1909, B. W. KILGORE ET AL. (*Bul. N. C. Dept. Agr., 31 (1910), No. 3, pp. 71*).—The analyses here reported are of samples collected by the fertilizer inspectors of the state department of agriculture during the fall of 1909. A list is given of brands of fertilizers registered for sale in 1910.

Analyses of licensed commercial fertilizers, 1910, F. W. WOLL (*Wisconsin Sta. Circ. Inform. 15, pp. 12*).—Analyses of 34 brands of fertilizers licensed for sale in the State during the year are reported, with notes on valuation and explanations of technical terms used in fertilizer analyses.

AGRICULTURAL BOTANY.

Overhead electrical discharges and plant growth, J. H. PRIESTLEY (*Jour. Bd. Agr. [London], 17 (1910), No. 1, pp. 16–28*).—An account is given of recent developments as to the effect of overhead electrical discharges on plant growth, the data being largely drawn from experiments by J. E. Newman carried on in cooperation with Sir Oliver Lodge. In experiments covering four years a considerable increase is noted in the production of cucumbers, strawberries, cabbages, beets, carrots, wheat, barley, and other crops. In one instance there was a decrease of 9 per cent in the production of strawberries from the quantity gathered from the control plats, but this is attributed to the fact that the season was a very dry one.

The influence of various colored lights on plants, O. MASULLI (*Bul. Orto Bot. R. Univ. Napoli, 2 (1909), No. 3, pp. 329–402, pls. 4*).—The author has made an extended study on the effect of different portions of the spectrum on the growth and development of a large number of plants.

The experiments showed considerable variation on the part of the plants toward the different kinds of illumination. Germination was found to be not directly influenced by the different radiations, the thermal power having greater influence than the color of the illumination. Germination was retarded or accelerated in direct proportion to the heat energy of the rays. The development in size of the leaves in general was greatest under the less refrangible rays, particularly under the yellow and green light. The effect of the different

colored illuminations on the position and texture of the leaves, development of the mesophyll, palisade parenchyma, chloroplasts, stems, etc., are discussed at some length.

The author concludes that the favorable effect of yellow and green light on plants is due not only to their thermal effect, but also to the fact that these two colors of light more nearly approach white light in their illumination.

The closing response in Dionæa, W. H. BROWN and L. W. SHARP (*Bot. Gaz., 49 (1910), No. 4, pp. 290–302, dgm. 1*).—A study has been made of *D. muscipula* to determine the cause of its closing response. This was found to depend on the intensity rather than on the number of stimuli.

"Response is normally brought about by the compression of certain cells at the bases of the sensitive hairs, but the compression of other cells of the blade also causes closure, and it is probable that the latter cells are equally sensitive with the cells at the bases of the hairs, as is indicated by electrical and thermal stimulation.

"The closing response follows the application of mechanical, electrical, and thermal stimulation. It also follows a combination of stimuli of two kinds when consecutively applied, the individual stimuli being of an intensity such that either alone would be insufficient.

"The effect of mechanical stimulation is due to compression of cells, and not to contact with a hard object, continued pressure, or release of pressure. The failure of the leaf to respond to shaking is probably connected with the small inertia of the sensitive hairs, and the slight resistance offered by the air to their passage through it.

"Water at room temperature causes closure only when it bends a sensitive hair.

"After one mechanical stimulus there is a short period during which a second mechanical stimulus is ineffective."

The effect of aqueous solutions of electrolytes on germination, H. MICHEELS (*Acad. Roy. Belg., Bul. Cl. Sci., 1909, No. 11, pp. 1076–1118*).—A report is given of studies on the influence of solutions of certain electrolytes on the germination and early growth of wheat. The experiments were carried on with solutions of potassium chlorid, potassium nitrate, potassium hydroxid, sodium chlorid, sodium nitrate, calcium carbonate, magnesium chlorid, aluminum chlorid, and other salts, representing different osmotic pressures, the salts being used singly and in various combinations.

In studies with monovalent, divalent, and trivalent cations, as represented by N/100 and N/1000 solutions of sodium chlorid, magnesium chlorid, and aluminum chlorid, the most favorable results were obtained with the most dilute solutions. Comparisons between N/10, N/100, and N/1000 solutions of sodium chlorid showed that the N/100 solution was the most favorable to germination and growth of the seedlings. In a similar manner it was found that N/100 solution of potassium chlorid, and N/1000 solutions of potassium nitrate, potassium hydroxid, and calcium nitrate gave the best results. Where mixtures of N/100 solutions of potassium chlorid and potassium nitrate were tested the combination was less favorable to growth, as expressed by the length of the roots, than either of the salts used alone. The combination favored the development of root hairs as compared with potassium nitrate, although the roots were shorter. The leaves, where the two were combined, were intermediate between those produced in the simple cultures.

When sodium nitrate and potassium nitrate in N/100 solution were compared with mixtures of the two, the mixture of the two salts was found decidedly favorable, the sodium compound having exercised a protective effect. Addi-

tional experiments on the protective action of various salts confirmed the conclusions of Osterhout (E. S. R., 20, p. 527). Attention is called by the author to previous publications which he claims established the priority of his investigations regarding the protective action of some of these salts when used in combination.

The effect of mineral salts on proteid metabolism in plants, W. ZALESKI and W. ISRAILSKY (*Biochem. Ztschr.*, *24* (*1910*), *No. 1-2*, *pp. 14-21*).—According to the authors, it was shown by Prianishnikov that calcium sulphite accelerated the proteid metabolism in germinating vetch seed. Later it was found (E. S. R., 15, p. 447) that mineral salts, and especially the calcium salts, aided in protein regeneration, which was retarded whenever calcium was excluded from the culture medium.

The authors conducted a series of experiments with wheat and lupine seedlings to determine the effect of potassium nitrate, magnesium sulphate, and calcium nitrate, as well as of a complete nutrient solution containing the above salts together with phosphoric acid, on the proteid metabolism as well as the changes in dry matter in young plants. The young shoots were separated from the cotyledons and the proteid metabolism determined for the different parts of the plant.

The complete nutrient solution favored the reduction of proteid nitrogen in the lupine seedlings as compared with those grown in distilled water. There was found an increase of nitrogenous compounds in the axial organs of the plant, with a corresponding reduction in the cotyledons. Potassium nitrate had practically no effect on the total nitrogen metabolism of lupines. Magnesium sulphate not only diminished catabolism in the plants, but also reduced the amount of proteid nitrogen in the axial organs. A slight increase in the nitrogen content was noted in the axial portions of plants which had received calcium nitrate, but there was little difference in the total for the entire plant. With wheat seedlings the chemicals in general reduced the catabolic activities of the plants as compared with those grown for 10 days in distilled water.

The relation of plants to certain salts, I, II, B. HANSTEEN (*Jahrb. Wiss. Bot.* [*Pringsheim*], *47* (*1910*), *No. 3*, *pp. 289-376*, *pl. 1*, *figs. 19*).—An extended study was made by means of water cultures on the influence of solutions of potassium, sodium, calcium, and magnesium, as well as of various mixtures of these salts, on the toxic effect of lime-free solutions and the antitoxic action of lime. The plants used were seedlings of wheat, oats, beans, vetches, poppies, mustard, radish, red clover, and other plants, and the effect of the various solutions on the plant, especially on root growth and root hair development, was noted.

Magnesium, sodium, and potassium were found injurious to roots in the order named, magnesium being the most toxic. Lime proved a corrective of the injury caused by the other salts. The ratio of lime to the other chemicals varied somewhat, but should always be increased with a greater concentration of the other compounds. Temperature, osmotic pressure, the nature of the anions, and similar factors had very little connection with the antitoxic action of the calcium salts. Certain antagonisms were noted between some of the compounds. Potassium and magnesium were markedly antagonistic, as shown with wheat seedlings, while the antagonism between potassium and sodium was hardly perceptible.

The nature of the effect of the salts on the plants is discussed at considerable length.

The absorption of barium by plants, H. COLIN and J. DE RUFZ (*Compt. Rend. Acad. Sci.* [*Paris*], *150* (*1910*), *No. 17*, *pp. 1074-1076*).—The results of a

study of peas, maize, and beans cultivated in dilute solutions of nitrate or chlorid of barium are given, the experiments with peas being described at considerable extent. In these experiments, after germinating the peas in distilled water they were placed in solutions of barium, a strength of 0.125 per thousand being found best suited to the purpose of the investigations. After growing the plants for some time in these solutions they were examined microchemically and the amount of barium determined chemically.

In the experiments with peas practically all the barium was found localized in the roots, although there were traces to be found in the stems of the plants.

Relation of the salts of calcium to the assimilation of nitrate nitrogen by green plants, V. P. ERMAKOV (*Univ. Izv. [Kiev], 48 (1908), No. 5, Art. 3, pp. 1–68; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 3, pp. 394–396*).—In a series of experiments leaves of a number of species of plants were placed with their petioles in solutions of nitrates for a day or two, after which they were examined microchemically for nitrates. An accumulation of nitrates was observed only in the leaves which had not received any calcium.

In another series of experiments leaves which had been previously placed in solutions of potassium nitrate or sodium nitrate and had accumulated nitrates were transferred into solutions containing calcium salts, when the nitrates which had been accumulated by the leaves disappeared. From this the author concludes that for the assimilation of nitric nitrogen the presence of calcium salts is necessary.

In addition to the microchemical examination, quantitative determinations of nitric nitrogen in the leaves were made, and the analytical results corroborated those obtained microchemically. In the presence of calcium chlorid and calcium sulphate the leaves of grapes and Paulownia were found to assimilate more than 90 per cent of the accumulated nitrates, while in the absence of these salts only from 10 to 15 per cent of the nitrogen was assimilated.

Another series of experiments was conducted to determine the dependence of the accumulation of organic nitrogen on the presence or absence of calcium, comparing grape leaves placed for 24 hours in solutions of calcium nitrate and potassium nitrate, potassium nitrate, potassium nitrate and calcium chlorid, potassium nitrate and calcium sulphate, and potassium nitrate and potassium sulphate. In each case 100 leaves were used, 50 receiving calcium, the others not. All the experiments showed that in the plants receiving calcium, the amount of organic nitrogen was increased on an average about 10 per cent, while it remained unchanged in those receiving no calcium salt.

The influence of a lack of lime on the seedlings of Phaseolus vulgaris, DORA HOFFMANN (*Österr. Bot. Ztschr., 60 (1910), No. 2, pp. 61–64*).—Experiments were conducted with bean seedlings the roots of which had been wounded to test the effect of a lack of lime on the plants. The roots were entirely removed or half their length cut off and the seedlings were then grown in distilled water, spring water, a complete nutrient solution, and a similar solution without lime.

In the cultures grown in spring water and in the nutrient solution the roots of all the plants remained sound, while in the distilled water and in the lime-free solution they became diseased in from 5 to 11 days. In a similar manner the aerial parts of the plants became diseased, those without any roots remaining free from disease 1 or 2 days longer than those with intact roots. The plants with half roots developed symptoms of disease about the same time or a little later than those with sound roots. In general the injury to the aerial portions of the seedlings due to a lack of lime was in inverse proportion to the root development.

Recent investigations on the rôle of hydrocyanic acid in plants, III, M. Treub (*Ann. Jard. Bot. Buitenzorg, 2. ser., 8 (1909), pt. 1, pp. 85–118, pls. 6; abs. in Naturw. Rundschau, 25 (1910), No. 12, pp. 147, 148*).—The author concludes and summarizes his investigations begun in 1895 on the presence of hydrocyanic acid in plants (E. S. R., 19, p. 932). In the present paper the results of his studies on sorghum, passion flower, *Alocasia macrorhiza*, *Hevea brasiliensis*, and *Prunus javanica* are discussed at length.

In reviewing the previous work the author claims that nothing has been brought to light to invalidate his conclusion that hydrocyanic acid plays an important rôle in plant nutrition and that it is a plastic material in the formation of albuminoids. The presence of carbohydrates is fundamental to its formation, and inorganic substances furnished by the soil through the sap of the plant are a second requisite for its formation. He claims that recent investigations have confirmed his earlier hypothesis, which, briefly stated, is that hydrocyanic acid is the first recognizable product in the assimilation of nitrogen in plants and that it is probably the first organic nitrogenous compound formed by them.

Chlorophyll assimilation of carbon, G. Kimpflin (*Essai sur l'Assimilation Photochlorophyllienne du Carbone. Thesis, Univ. Lyon, 1908, p. 159, figs. 13; rev. in Bot. Centbl., 113 (1910), No. 10, pp. 248, 249*).—After a historical résumé of the subject, the author gives a discussion of some of the modern theories regarding photosynthesis. Following this are accounts of experiments with green and etiolated plants, the effect of illumination, etc.

In studying the biological phenomena of photosynthesis, the author found that after illumination a certain period of time must follow before the carbon dioxid assimilation can begin, and conversely that it is continued beyond the time of illumination. His experiments show that the plant makes use of formaldehyde in the synthesis of its carbohydrates and that by the use of certain reagents it is possible to recognize formaldehyde in the parenchyma of the leaf. It appears to be localized and in connection with the chloroplasts, and consequently does not manifest an injurious action on the protoplasm. The author considers chlorophyll in plants as the agent for the transposition of light and electrical energy.

A bibliography of nearly 500 titles concludes the paper.

[Nitrogen content of nodules and rootlets of immortelle trees], P. Carmody (*Ann. Rpt. Dept. Agr. Trinidad and Tobago, 1908–9, p. 41*).—The nodules were found to contain considerably larger percentages of nitrogen than the rootlets. The difference, however, was smaller when the trees were in flower.

The toxic properties of tannin, M. T. Cook (*Abs. in Science, n. ser., 31 (1910), No. 802, pp. 751, 752*).—The author has carried on experiments to determine the toxic properties of tannin when added to media in which different species of fungi were grown.

None of the species of Glœosporium or Colletotrichum was found to give maximum growths in media containing more than 0.4 per cent, while the majority gave the best growth where no tannin was present. Species of Fusarium, Neocosmospora, Cladosporium, Sphæropsis, Sclerotinia, and Phoma were more resistant than Glœosporium, but none gave maximum growths in media containing more than 0.6 per cent. Species of Penicillium were found to be retarded for a time, but they had a tendency to overcome the toxic action of the tannin.

The experiments have been duplicated and comparisons made of the growth of organisms in media in which the proteid and tannin formed a precipitate and in media in which proteid was not used. Experiments were also made to

test the relative resistance of cork from which tannin had been extracted as compared with cork soaked with tannin in various percentages.

FIELD CROPS.

A manual of practical farming, J. McLennan (*New York, 1910, pp. X+298, pls. 33, figs. 26*).—Soil problems and the production of farm crops and animals are treated in this book with the primary purpose of aiding the practical farmer and student of agriculture. Tables and technical terms have been avoided.

Dry farming experiments, W. Angus (*Jour. Dept. Agr. So. Aust., 13* (*1910*), *No. 8, pp. 642–645*).—Dry farming experiments in disking, plowing at various depths, and subsurface packing are reported.

Deep plowing proved advantageous when the land was fallowed. The most satisfactory increase followed the use of the subsurface packer immediately after the plow in the process of fallowing both in deep and shallow plowing. No advantage was apparent from the use of the subsurface packer immediately before sowing on fallow land or in fall plowing.

Dry farming practice in Montana, A. Atkinson and F. S. Cooley (*Montana Sta. Circ. 3, pp. 11–34, figs. 7*).—This circular discusses the equipment necessary for the beginner, the conservation of moisture, tillage operations, dry-land crops, live stock on the farm, and other topics of general interest to the dry farmer. A brief reading list is appended.

Water requirements of crops in India, J. W. Leather (*Mem. Dept. Agr. India, Chem. Ser., 1* (*1910*), *No. 8, pp. 133–184, pls. 15, charts 23*).—The transpiration ratios of 10 important field crops as determined by Lawes, Hellriegel, Wollny, and King are presented in parallel columns. The authors have made their own determinations, with a number of field crops, each of which was tested in glazed stoneware jars of soil of capacities varying from 14 to 50 kg each. The water and fertilizing materials added and the conditions of exposure to sunlight and winds were varied. The water was added by means of unglazed earthenware cylinders, 2 in. in diameter and from 6 to 10 in. deep and provided with small holes in the lower part. Thus the surface soil remained loose and nearly air-dry, cracking was avoided, and the use of covered jars rendered unnecessary. As control jars showed that the loss of water from the soil under these conditions was very regular and was small by comparison with that transpired by a heavy crop, it introduced an error which was immaterial save in the case of small stunted plants.

The exposure of the jars to the sun had no influence on the ratio, but the addition of nitrate and phosphate or rape cake and phosphate reduced the ratio very greatly. A lower ratio was obtained by the use of large jars containing a large mass of earth, this lowering the ratio from 10 to 20 per cent. Other things being equal the better development of the plant was accompanied by a lower ratio. Not only manure but also good tillage and deep soil or any factor which aided in the development of the crop appeared to tend toward an economy of water. In general, crops which mature rapidly have a low ratio and the longer lived ones a high ratio, but this rule is not without conspicuous exceptions. A table presents the ratio of each of the crops experimented with for a harvest of 1,000, 2,000, 3,000, 4,000, or 5,000 lbs. per acre, and the number of tons per acre or acre inches of water required to produce these yields. The average of all ratios obtained for each crop is shown in the following table.

Transpiration ratios of various field crops.

Crop.	Cold weather crops. Unmanured.	Cold weather crops. Manured.	Monsoon crops. Unmanured.	Monsoon crops. Manured.
Wheat	850	550		
Barley	680	480		
Oats	870	550		
Linseed	1,000	1,000		
Sarson (*Brassica campestris*)	740	620		
Peas	830	530		
Gram (*Cicer arietinum*)	1,400	1,000		
Maize			450	330
Juar (*Andropogon sorghum*)			400	400
Murwa (*Eleusine coracana*)			250	250
Kodo (*Paspalum scrobiculatum*)			300	300
Arhar (*Cajanus indicus*)			1,000	600
Guar (*Cyamopsis psoralioides*)			1,100	600

Swedish methods of crop improvement, G. H. Clark (*Ottawa: Govt., 1910, pp. 117–127*).—This is a report of observations made during a visit to England, Scotland, Holland, Denmark, Sweden, France, and Germany for the purpose of studying the methods of seed production and crop improvement.

The rotation experiment in Rosenthal, K. von Rümker et al. (*Mitt. Landw. Inst. Breslau, 5 (1909), No. 4, pp. 491–614, figs. 2*).—The author gives a preliminary report on six different systems of crop rotations followed since 1900 and presents in tabular form the data thus far collected.

[Variety and other tests of field crops], C. A. Zavitz (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 166–230, figs. 8*).—The 1908 report has been previously noted (E. S. R., 21, p. 325).

Selected strains of 16 varieties of oats, barley, wheat, rye, millet, and field beans produced yields higher than those of the standard varieties by 0.6 to 12.6 bu. per acre, except in two cases in which the selected strains fell slightly below the standard varieties. Slight sprouting in the field checked the vitality of the grain as seed. Twelve separate tests with winter wheat showed a yield greater by 6.8 bu. per acre from large than from small seeds, 7.8 bu. from plump than from shrunken seeds, and 35.6 bu. from sound than from broken seeds. Seed thoroughly ripened before harvesting produced greater yields of grain and straw as well as grain with a greater weight per bushel. Plump seed produced 7.8 bu. more per acre in the case of barley and 5 bu. more in case of spring wheat than shrunken seed. Sound grain surpassed broken grain in yield by an average of 10.6 bu. per acre in 6 years' tests with barley, and by an average of 19 bu. per acre in 9 years' tests with peas.

In a test of the bluestone, the hot water, and the immersion and sprinkling formalin treatments of grain for smut, it appeared that the greatest yields of winter wheat and oats per acre followed the immersion of seed in a formalin solution for a period of 20 minutes. The Early Ripe oats proved almost absolutely free of smut during the period 1902–1909, inclusive. The other 5 varieties were more frequently infected during the first half of the test when they were left untreated.

Flax produced the longest straw when less than 1 bu. of seed was used but the greatest yields of straw and grain when from 2 to 3 bu. of seed per acre were sown. The results of experiments in which oats were planted by hand at different distances are only partially reported at this time. Among 12 varieties tested the number of stools per plant ranged from 6 in the case of the Early White Jewel to 22 in the case of the Burt variety. Increase in distance between

oat plants was accompanied by increase in number of stools, percentage of rust, lateness of maturity, and height of crop. The Joanette, Regenerated Abundance (imported seed), and Banner varieties produced an average of 8.9 bu. more oats per acre when 4 bu. was sown than when 2 was used, while Ontario seed of Regenerated Abundance produced 3 bu. more per acre from the lighter seeding. Drilled oats yielded 66.4 bu. per acre as compared with 61 bu. from those sown broadcast.

In a 3 years' test barley and oats sown together produced the greatest yield when seeded at the rate of 4 pk. of each per acre. A 3 years' test of different combinations of 19 varieties of grains showed the highest results from mixtures of (1) 48 lbs. of Mandscheuri barley and 56 lbs. of flax, and (2) 48 lbs. of Mandscheuri barley and 34 lbs. of Daubeney oats.

Tests of the power of different varieties of different grains to reproduce themselves in competition with other varieties indicated that the Mandscheuri barley excelled all others tested in this respect, while spring rye, Wild Goose wheat, field peas, and hull-less barley were more deficient in this power. In each of 2 tests lasting 3 and 6 years respectively emmer occupied a medium place and was represented in the yield by about the same percentage as in the seed sown. Mixtures of different varieties of the same class of grain tested 5 years with winter wheat and 3 with barley and oats showed that the mixtures produced results similar to the average results of the varieties when grown separately. The yields of Mandscheuri, O. A. C. No. 21, and winter barley are stated and discussed. In a 3 years' test, Daubeney oats averaged 40 per cent lodged 3 weeks before ripening, and Sheffield Standard 91 per cent when ripe. Liberty had the lowest averages for lodging, 10 and 32 per cent, respectively, for the two periods.

During the period 1897–1909, *Triticum vulgare* averaged 33.5, *T. durum* 38.0, *T. polonicum* 23.9, and *T. turgidum* 26.1 bu. per acre. The 4 species were represented in the test by the Red Fife, Wild Goose, Polish, and Seven-Headed varieties, of which the last two and Alaska (*T. turgidum*) have been sensationally discussed in the press. June 1 and 16 proved the best dates of sowing for Japanese Panicle and Japanese Barnyard millets and July 1 for Hungarian grass, as indicated by a 3 years' test. A 4 years' test showed that a sowing of 51 lbs. of oats, 30 lbs. of Early Amber sugar cane, and 7 lbs. of common red clover seed per acre gives a good pasture for cattle during the year of sowing.

The more notable yields obtained in variety tests are indicated by the following table:

Highest yields secured in variety tests.

Grain and variety.	No. of varieties tested.	Length of test.	Average yield per acre.	Grain and variety.	No. of varieties tested.	Length of test.	Average yield per acre.
Emmer (Common)..	12	1902-1907.	2,756 lbs.	Oats (Joanette)....	4	1909......	78.7 bu.
Barley (Mandscheuri)..........	12	....do....	2,715 lbs.	Barley, six-rowed (Mandscheuri)...	18	5 yrs.....	72.6 bu.
Oats (Siberian).....	4	20 yrs....	87 7 bu.	Barley, six-rowed (Success).......	18	....do....	51.1 bu.
Oats (Joanette).....	4	....do....	87.4 bu.	Barley, two-rowed (Imported No. 5,591 Iowa).......	8	....do....	60.7 bu.
Barley (Mandscheuri)..........	4	....do....	71.9 bu.	Barley, hull-less (Purple).........	7	....do....	43.0 bu.
Winter wheat (Dawson Golden Chaff).	4	14 yrs....	54.8 bu.	Oats (Daubeney)..	48	... do....	87.4 bu.
Spring wheat (Saxonka).............	3	20 yrs....	31.3 bu.	Oats (Siberian)....	48	....do....	86.9 bu.
Spring wheat (Red Fife).............	3	....do....	31.2 bu.	Oats (Alaska)......	48	....do....	85.3 bu.
Spring wheat (Wild Goose)............	3	17 yrs....	33.2 bu.	Winter wheat (Dawson Golden Chaff).	15	14 yrs...	54.8 bu.
Potatoes (Empire State).............	4	20 yrs....	221.7 bu.	Spring wheat (Minnesota No. 163)...	22	1905-1909.	35.3 bu.

Highest yields secured in variety tests—Continued.

Grain and variety.	No. of varieties tested.	Length of test.	Average yield per acre.	Grain and variety.	No. of varieties tested.	Length of test.	Average yield per acre.
Spring wheat (Wild Goose)	6	17 yrs	38.2 bu.	Sugar beet (Bruce Giant White Feeding)	12	....do....	26.3 tons.
Alfalfa, green crop		1896-1909.	20.91 tons	Sugar beet (Rennie Jumbo)	23	1909	21.1 tons.
Alfalfa hay		....do....	5.10 tons	Field carrots (Steele Improved Short White)	11	5 yrs	28.0 tons.
Winter rye (Mammoth White)	4	6 yrs	60.50 bu.	Sorghum (Orange Sugar Cane)	10	1899-1909.	18.6 tons.
Emmer (Common)	3	8 yrs	3,082 lbs.	Millet (Japanese Panicle)	9	1905-1909.	4.4 tons.
Spelt (Alstroum)	4	....do....	2,259 lbs.	Cabbage (Sutton Earliest Drumhead)	4	....do....	27.7 tons.
Rye (Saatroggen)	4	5 yrs	30.5 bu.	Kale, Thousand-headed	3	....do....	26.0 tons.
Buckwheat (Rye Buckwheat)	5	....do....	34.0 bu.	Rape (Large Seeded Umbrella)	8	....do....	22.1 tons.
Field peas (Early Britain)	8	10 yrs	39.4 bu.	Collards, Marrow	1	....do....	21.9 tons.
Field beans (Pearce Improved Tree)	8	11 yrs	23.0 bu.	Broccoli, Purple Sprouting	1	....do....	20.8 tons.
Flax (Manitoba)	4	5 yrs	20.0 bu.	Brussels sprouts	1	....do....	16.4 tons.
Millet (Siberian)	7	....do....	51.6 bu.	Mustard, New Chinese	6	....do....	15.3 tons.
Emmer (Black Winter)	1	3 yrs	2,055 lbs.				
Sunflower (White Beauty)	7	11 yrs	72.9 bu.				
Sorghum (Australian Broom Corn)	18	1909	19.4 bu.				
Corn (White Cap Yellow Dent)	14	5 yrs	66.1 bu.				

[Experiments with field crops, Barbados, 1908–9], J. R. BOVELL (*Imp. Dept. Agr. West Indies, Rpt. Local Dept. Agr. Barbados, 1908–9, pp. 2–13*).—The introduction of sugar canes for planting is noted and brief reports given on cooperative work with Sea Island cotton on 9 estates and Silket cotton on 14 estates.

The Silket variety was found growing among plants from seed originally obtained from this Department. Severe drought and the attacks of the scarabee (*Cryptorhynchus batatæ*) prevented entirely satisfactory results with a large number of varieties of sweet potatoes recently obtained from the Pennsylvania Experiment Station and elsewhere. The maximum yield of 22,240 lbs. per acre was produced by the Southern Queen variety. A report is also given of the results of sowings of seed from the Vincelonian, Six Weeks, and Kala varieties. In 1907, among sweet and bitter varieties of cassava the maximum yields were at the rates of 16,920 and 21,394 lbs. per acre respectively, while in 1908, there were 12,840 and 23,280 lbs. respectively. Twenty-nine varieties of economic Colocasieæ introduced from the Porto Rico Station produced results ranging from a total failure to a yield of 3,120 lbs. of tubers per acre.

[Notes on field crops], R. G. OSÉS, J. G. COUBET, and J. C. PAGLIERY (*Estac. Expt. Agron. Cuba Circ. 37, pp. 3–30, figs. 4*).—The writers discuss the cause for the low price of tobacco in Cuba and make suggestions as to methods of cultivation of jute, sisal hemp, rubber, coconut palms, and *Erythoroxylon coca*.

Experiment field of the Taganrog Agricultural Society, N. T. BILINSKI (In *Kratkagho otcheta vozniknov. i desyatil. dyeyatel'nosti (1889–1908) op. polya Taghanroghskagho s.-kh. obshchestva. Taganrog, 1909, pp. 15–41; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 5, pp. 667–673*).—The black and early green fallows give better yields of wheat and rye than the late green fallow and most frequently the early green fallow gives the highest yields. Manure produces a greater effect on black fallow than on early green fallow. Rye is more sensitive to manure than wheat.

The results of the Lauchstädt experiments with varieties of small grains, SCHNEIDEWIND (*Illus. Landw. Ztg., 29 (1909), No. 82, pp. 773–775; abs. in Zentbl. Agr. Chem., 39 (1910), No. 2, pp. 109–114*).—The yields of straw and grain per hectare and the protein content of the grain of 18 varieties of wheat during the period 1904–1909, inclusive, are reported. Similar data are presented in tabular form for 9 varieties of oats and 11 of barley during the period 1902–1909, inclusive.

Irrigation of grain, W. W. MCLAUGHLIN (*U. S. Dept. Agr., Farmers' Bul. 399, pp. 23, figs. 7*).—This discusses the relative merit of the various methods of applying water to grain crops, explains flooding from field ditches, between borders, and in checks, and gives directions for furrow or corrugation irrigation. Other topics dealt with are the proper time of irrigation, the quantity of water required, the relation of irrigation to the rate of seeding, and the value of irrigated grain land. The cost of growing grain per acre is estimated at $21.35, and the gross returns of a crop of 40 bu. per acre at $30.40.

Dry-land grains for western North and South Dakota, C. SALMON (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 59, pp. 24, fig. 1*).—This paper reports results obtained by the Office of Grain Investigations of this Department at Bellefourche and Highmore, S. Dak., and Dickinson, N. Dak., in cooperation with the North Dakota and South Dakota stations. The soil and climate at each station are discussed.

Winter wheat was tried at each station but proved a decided success only at Bellefourche. The 7 best varieties averaged 23.4 bu. per acre, while 7 varieties of Durum wheat on similar ground yielded 23.2 bu. per acre. The best Durum wheat yielded 18 to 40 per cent more than the best common spring wheat, but this difference was increased to 75 to 100 per cent in seasons of unusually low rainfall. The difference in yield is more than enough to offset the difference in price.

Progress reports are given of tests of rate of seeding, time of seeding, and the milling and baking qualities of a number of wheats.

Other results indicate that extensive areas in the northern Great Plains will produce winter wheat profitably, that the only sure way of securing a crop of winter wheat is to grow it on summer fallow land, and that early varieties of oats will usually produce the greatest yields. Two-rowed barley uniformly produced the highest yields and hull-less barley the lowest yields of this grain.

The results obtained at the 3 substations may be summarized by the following table:

Yields of leading varieties of grains tested.

G. I. No.	Kind of grain.	No. of strains tested.	Period of test.	Substation.	Leading variety.	Average yield per acre.
						Bushels.
1440	Wheat, durum	7	1906-9	Bellefourche	Kubanka	23.2
3025	Wheat, common	5	1906-9	.....do	Powers Fife	17.9
1516	Wheat, durum	8	1903-1909	Highmore	Kubanka	22.4
1493	.....do	8	1903-1909	.....do	Wild Goose	22.3
1440	.....do	8	1907-1909	Dickinson	Kubanka	29.6
1493	.....do	8	1907-1909	.....do	Wild Goose	29.6
1517	Wheat, common	3	1907-1909	.....do	Ghirka Spring	25.0
459	Oats	9	1906-9	Bellefourche	Kherson	36.4
165	.....do	9	1906-9	.....do	Sixty-Day	36.3
134	.....do	16	1903-1909	Highmore	Swedish Select	41.3
......	.....do	16	1903-1909	.....do	Kherson	41.5
......	.....do	21	1907-1909	Dickinson	Early Mountain	69.2
24	Barley, two-row	9	1906-9	Bellefourche	Hanna	26.4
24	.....do	15	1903-1909	Highmore	.....do	28.2
208	.....do	11	1907-1909	Dickinson	.....do	40.1

Contributions on the breeding of peas and field beans, G. Frölich (*Fühling's Landw. Ztg., 58 (1909), No. 20, pp. 713–726*).—The methods followed are briefly described and the work discussed with special reference to the number of stems and number of pods per plant. The results of variety tests are also stated.

The bean plants having 2 or 3 stems excelled the one-stemmed plants in plant weight, seed weight, seed number, and number of pods, but the number of seeds per pod was approximately equal. The one-stemmed plants had the greatest height. No correlation was observed between branching tendency and the ability to produce a large yield.

Correlation between the weight and percentage protein content of barley kernels, E. Sperling (*Illus. Landw. Ztg., 30 (1910), No. 19, pp. 175, 176*).—The average kernel weight and percentage protein content of a large number of barley samples are presented in tabular form. No regularity of correlation between the two characters could be observed by the author.

The separation of seed barley by the specific gravity method, H. B. Derr (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 62, pp. 6, fig. 1*).—The specific gravity method of separating seed barley consists in immersing the seed in water, stirring it thoroughly, skimming off and rejecting that which floats, and carefully drying the selected seed. It may be combined with the treatment for smut. A brief bibliography and review of the literature of the subject is given.

A more profitable corn-planting method, C. P. Hartley (*U. S. Dept. Agr., Farmers' Bul. 400, pp. 14, figs. 5*).—This bulletin compares the advantages of drilling and ordinary checking of corn with those of "kernel-spaced checking" or checking in which the hill is one of 4 stalks, each placed at 1 of the corners of a 5-inch or larger square. In tests of this method conducted at Round Hill and McLean, Va., and at Piketon, Ohio, on different soils and with different types of corn, gains of 3¾, 5, and 4 per cent, respectively, over the yield secured by the ordinary method were obtained.

The author suggests the manufacture of check rowers with 2 shoes for each corn row and a separate dropping tube for each kernel of a hill, and adjustable in point of number of kernels dropped and the spacing between the kernels of a hill. It is pointed out that the increased yield due to such kernel spacing should be clear gain, as a properly constructed check rower should drop the seed in separate places as rapidly and cheaply as the present check rower does its work. No difficulty was encountered in cultivating corn planted in this manner in rows 3½ ft. apart. Three-horse 2-row cultivators could have been used to as good advantage as in the usual method of checking, even though the kernels had been spaced 6 or 8 in. apart. At McLean, Va., and Piketon, Ohio, it was noted that kernel-spaced rows were less subject to damage by winds than those checked in the ordinary manner.

Variety work with cotton and notes on selection, R. J. H. DeLoach (*Bul. Univ. Ga., No. 115, pp. 8, figs. 3*).—In a test of 27 varieties, Cook Improved and Cleveland Big Boll produced 557.6 and 518.4 lbs. per acre of lint cotton respectively. Classifications of varieties are given on the basis of number of bolls to produce 1 lb. of lint, earliness, number of seed per pound, and lint percentage, together with notes on selection.

Suggestions on cotton cultivation and fertilization, R. J. H. DeLoach and A. M. Soule (*Bul. Univ. Ga., No. 118, pp. 8*).—This bulletin gives directions for cotton production in Georgia. A score card suggests points to be observed in selecting plants for seed.

Distribution of cotton seed in 1910, D. N. Shoemaker (*U. S. Dept. Agr., Bur. Plant Indus. Doc. 535, pp. 13, figs. 4*).—Two methods of seed selection are discussed and the qualities to be sought in cotton improvement and methods

of planting small amounts of seeds are stated. The history, principal characters, and more important facts relating to 2 select strains of the Triumph variety; the Columbia, a long-stapled upland variety; the Dillon, a wilt-resistant variety; the Sistrunk, a select strain; and the Trook cotton are given.

[Fiber tests], H. G. HAVIK (*Jaarb. Dept. Landb. Nederland. Indië, 1908, pp. 319–333, pls. 2*).—These pages state the results of tests of the breaking strength of fibers of numerous varieties of cotton, sisal hemp, and Manila hemp. Chemical analyses are also given.

On the value of the male hop, E. S. SALMON and A. AMOS (*Jour. Southeast. Agr. Col. Wye, 1908, No. 17, pp. 364–391, pls. 11, figs. 8; County Councils Kent and Surrey, Southeast. Agr. Col. Wye [Leaflet, 1908], pp. 26, pls. 11, figs. 8; Jour. Inst. Brew., 14 (1908), No. 4, pp. 309–331, pls. 12, figs. 8*).—The investigations of the authors show that only when a certain number of the bracteoles bear seeds will the hops "grow out" properly, and therefore, it is desirable that the flower at the base of each bracteole be pollenized. Burrs enclosed throughout in paper bags in no case produced seeds, but burrs from which the bag was removed for a moment and pollen dust applied with a paint brush produced full-seeded well-grown hops.

The number of seeded bracteoles on the hops studied varied from 3 to 16, the number of seedless bracteoles from 10 to 32, and the total number from 14 to 36, while the length per hop varied from ¾ to 1½ in. The hops having the greatest number of seeds were the longest, except in one instance.

One-seventh acre of seeded white bine hops produced 88½ bu. as compared with 42½ bu. of seedless hops produced on an equal area in the same garden. The seeded hops were valued at 84 to 95s. per bushel and the seedless at 54 to 70s. The added value due to fertilization was about £24 10s. per acre. As the official opinion on the Continent seems to be that the presence of the male hop is injurious, it is suggested that these observations may not apply with equal force to white, green, and red bine varieties.

Seeded hops bearing an average of 9.5 seeds per hop contained 15 per cent of resin and produced 8¾ cwt. per acre, or 147 lbs. of resin, while seedless hops averaging 0.5 of 1 seed per hop contained 17.2 per cent of resins and produced, under similar circumstances, 4¾ cwt. per acre, or 92 lbs. of resin.

Sixty-Day and Kherson oats, C. W. WARBURTON (*U. S. Dept. Agr., Farmers' Bul. 395, pp. 27, figs. 5*).—This discusses the need for early oats, states the history of Kherson and Sixty-Day oats, describes them, and discusses their characters and adaptability to different sections of the country. The results obtained by the state experiment stations are presented as compiled from bulletins, reports, and unpublished correspondence.

The Sixty-Day and Kherson varieties represent the most satisfactory type of early oats. They are desirable because of their heavy yield, low proportion of hull, and resistance to lodging, and their chief defects are the small size and yellow color of the berry. They have given the best results in the corn belt and on the dry farming region but larger, later varieties yield more heavily under irrigation and in the Northern States.

The present status of investigations of varieties of sugar beets, T. REMY and E. ZIMMERMANN (*Bl. Zuckerrübenbau, 17 (1910), Nos. 3, pp. 41–47; 4, pp. 57–70; 5, pp. 77–85*).—The author presents in tabular form the results of the investigations of numerous experimenters, the yield of beets and of sugar per hectare, and the percentage of sugar produced by each variety.

The significance of number of embryos and size of beet seed-balls, P. SCHUBART (*Centbl. Zuckerindus., 18 (1909), No. 13, pp. 362–364, chart 1*).—The author separated 1 kg. of beet seed into the portions that would pass through a sieve with meshes of 1½ mm., 2 mm., 2½ mm., and so on to 5 mm. Of those

which passed through the 1½ mm. meshes, none contained more than one embryo and the germination percentage after 6 days was 91. Tables show the percentage of seed balls removed at each successive sifting, the number of seeds in each portion, their germination percentage, and the number of embryos contained by each.

Work on the Mackay Central Sugar Experiment Station, L. C. McCready (*Ann. Rpt. Bur. Sugar Expt. Stas. [Queensland], 1908–9, pp. 10–63*).—This report gives the results of the final examination of the fifth rattoon crop of a considerable number of New Guinea varieties of sugar cane and a list of the varieties introduced by the Queensland Department of Agriculture, with a brief statement of the disposition made of each.

On irrigated plats, a plant crop and the first 3 rattoon crops produced 11.15 tons more cane per acre each year when fertilized than when left unmanured. On unirrigated plats the difference in yield between those manured and those not manured was 11.2 tons of cane per acre. Subsoiled and cultivated plats produced cane which in July showed a markedly greater density of juice (Brix), greater sucrose and purity percentages, and a slightly lower amount of glucose in juice, but in August these differences were less marked except in case of the glucose percentage. In September the cane on the subsoiled and cultivated plats stood lower in percentage of fiber in cane and higher in purity of juice.

Sets placed continuously in rows 5 ft. apart produced 2.8 tons of cane per acre more than did plants placed 6 in. apart in the row, 15.4 tons more than those planted 12 in. apart in the row, 35.6 tons more than those planted 18 in. apart in the row, 23.9 tons more than those planted 24 in. apart in the row, and 49¼ tons more than those planted 36 in. apart in the row, but required 20 cwt., 28 cwt., 34 cwt., 36 cwt., and 40 cwt. more seed per acre, respectively. Rows 4 ft. apart produced 37.8 tons of cane more than did rows 5 ft. apart, at an expenditure of 8 cwt. more seed per acre. They had a still greater advantage over rows 6 and 7 ft. apart.

A summary is given of the canes distributed to different districts and notes made on surghums, sisal hemp, cotton, fruit trees, grasses, and green manures.

Trifolium resupinatum, M. Bushuev (*Turkest. Selsk. Khoz., 1909, No. 1, pp. 17–20, abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 5, p. 726*).—Experiments with *T. resupinatum* on the experiment field of the Hunger Steppe have shown that this fodder plant is not inferior to old alfalfa and that it matures earlier. It gives two harvests during the summer.

Studies in Indian tobaccos, A. and G. L. C. Howard (*Mem. Dept. Agr. India, Bot. Ser., 3 (1910), No. 1, pp. 58, pls. 25*).—This publication describes *Nicotiana rustica*, states the principal characteristics of 6 varieties, and describes and illustrates 19 different types with which plant breeding work has been conducted for the purpose of studying the inheritance of characters.

The Florida velvet bean and related plants, C. V. Piper and S. M. Tracy (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 179, pp. 26, pls. 7*).—The nomenclature of *Stizolobium deeringianum* is discussed, the general botanical characters of the genus Stizolobium stated, and botanical descriptions of, and economic notes concerning, 9 species of this genus given.

Improvement of the wheat crop in California, H. F. Blanchard (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 178, pp. 37, figs. 10*).—This is a report of the experiments and observations of a number of years, conducted in part in cooperation with the California Experiment Station.

In many sections of California the soil is depleted in humus and nitrate, foul with weeds, and fails to produce profitable crops. Recommendations resulting from the work here reported favor smaller farms personally supervised, improved methods including deeper plowing, eradication of weeds, and the use of

Canadian field peas and Abruzzes rye as green manure crops, and the introduction of improved wheat varieties.

Land that produced 26 bu. of wheat after summer fallow produced 15.66 bu. the following year, while other wheat yields in the same experiment were as follows: After fallow 28 bu., after horse beans 35.33 bu., after Canadian field peas 33.66 bu., after rye and vetch 50.66 bu., after rye 51.33 bu. These preceding crops, except the wheat crop, were turned under as green manure. The vetch was a very poor stand. An improved method of cultivation including double-disking of stubble, 3 plowings, 5, 8, and 4 in. deep respectively, 3 harrowings, and the purchase of rye seed for a green manure crop increased the cost of cultivation by $4.60, but resulted in an increase of net profit of approximately $10 40.

Results already obtained led to the recommendation of this method of reducing weeds in wheat: Double disk at once after harvest. After the first rains have germinated the weed seed plow 4 or 5 in. deep and harrow, not later than December 15. Between March 1 and 15, plow 8 to 12 in. deep, harrow, and keep the land well cultivated through the summer whether it lies fallow or not. Plow 4 or 5 in. deep in November, sow the wheat about 2 in. deep, and double harrow just before the grain comes up. Harrow as soon as the ground is dry enough in the spring. Use a rapid, erect, early wheat.

In a test of 33 varieties, Bolo Blanco and Yantagbay produced yields of 58.39 and 57.28 bu. per acre respectively and were good in resistance to shattering. Chul (G. I. No. 2227) and Fretes (G. I. No. 1596) have proved superior to the White Australian and Club varieties in milling qualities and wet gluten content, having 55 and 40 per cent of wet gluten respectively as compared with from 10 to 38 per cent found in Australian samples. A brief history and description of each is given. Fretes required about the same quantity of water to produce a loaf of bread as the Australian wheat but produced loaves slightly smaller and heavier. The Chul variety is especially adapted to late seeding because of its vigorous growth and early ripening ability. It may be sown as late as February 25 but Fretes should be in the ground by December 15. It was found that long growing and fruiting periods produced grains lower in protein content than short growing and fruiting periods.

[Spraying tests and seed investigations], S. B. McCready (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 42-48, fig. 1*).—Spraying experiments indicate that mustard in standing cereal crops may most effectively be destroyed by the application of 100 lbs. of iron sulphate in 50 gal. of water during bright sunny weather just before the plants bloom. A heavy rain within 24 hours after spraying lessens the herbicidal activity of the solution. Whitening put into the solution renders the sprayed strips visible. Field bindweed, sow thistles, Canada thistles, and the plantains were not destroyed by the solution. Attempts to kill bindweed by applying 9 or 20 lbs. of iron sulphate crystals to patches 4 by 6 ft. resulted in only slight damage to the leaves in case of the lighter application, and 3 weeks later both plats appeared as green as ever. Tar paper weighed down with earth and stones at the sides failed to smother out this weed.

A large number of alfalfa and clover seed samples were examined to determine their purity, germination capacity, and general quality of the seed. From each of 10 samples of alfalfa seed selected at random from those submitted for test, 100 seed lots of bright, plump seeds, of discolored, plump seeds, and of shrunken seeds showed germination tests of 82.5, 55.3, and 29 per cent, respectively. From 10 other but similar lots, sowed in shallow pots, the numbers of healthy, vigorous plants secured were 712, 369, and 263 per 1,000 seeds, re-

spectively. In a similar test of red clover seed, the bright plump seeds and dull plump seeds showed germination percentages of 90.9 and 85.1 per cent, respectively. Purity tests are also reported for alsike, clover, and timothy seeds.

[Weeds in Ontario in 1908–9], S. B. McCready (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 37–40, figs. 2*).—A list is given of the most troublesome weeds in Ontario as indicated by the correspondence of 1908–9. Weeds recently introduced are roquette (*Eruca sativa*), Barnaby thistle (*Centaurea solstitialis*), bur grass, sandbur or hedgehog grass, forked catchfly (*Silene dichotoma*), gumweed or gum plant (*Grindelia squarrosa*), German knotgrass, and buffalo bur.

Corn cockle (*Jour. Bd. Agr. [London], 17 (1910), No. 1, pp. 38–45, fig. 1*).—These pages review fully English, German, and French literature on corn cockle with special reference to the descriptions of the plant and its fruit, the harm done by the plant as a weed and through its poisonous seed, and means of preventing it and of identifying it in foodstuffs.

A practical method of killing witch grass, A. J. Eaton and H. A. Edson (*Vermont Sta. Bul. 149, pp. 419–447, pls. 12, figs. 8*).—Experiments indicate that witch grass may be eradicated from corn fields by ridging the rows just before the corn sprouts, cultivating 3 days later with an implement that will draw the soil from the sides of the ridges, harrowing or weeding the same day, cultivating twice a week or 10 days later, weeding the same day and leveling the ridges, and hand hoeing in mid-July. Thorough, shallow cultivation must be given every week or 10 days at least from planting until the crop becomes too large.

On stony loam this treatment increased the corn yield 2¼ tons at a cost of $2.40 per ton; on river bottom sandy loam, 1⅝ tons at a cost of $5.50 per ton for the increase; on clay loam, 4¾ tons with an increased cost of $1.10 per ton; while on sand, an increase of ⅘ ton cost $7.30 per ton. On the treated areas the ears were larger and better filled and the ears and stover averaged 0.31 and 0.11 per cent higher respectively in protein content.

HORTICULTURE.

The rôle of anesthetics and other agents in plant forcing, W. Stuart (*Vermont Sta. Bul. 150, pp. 451–480, pls. 2, figs. 6*).—A detailed discussion of the author's experiments in the use of anesthetics in plant forcing, summarized accounts of which have been previously noted (E. S. R., 21, p. 544).

The work here discussed is based on studies begun in the fall of 1906 for the determination of the desiccating influence of anesthetics upon plants, to compare the relative value of anesthetics and other agents in plant forcing, and to determine the optimum dosage and period of treatment for various classes of plants. The plants included a large number of commercial flowering shrubs and bulbs. The anesthetic and nonanesthetic substances tested included ether, chloroform, ethyl iodid, ethyl bromid, ethyl chlorid, methyl chlorid, methyl alcohol, amyl alcohol, tetra-chlorid of carbon, and acetone. The mechanical effects of vacuum and of frost were also studied. The results secured in forcing lilacs, astilbe and lily-of-the-valley are rather fully discussed, and a table is given showing the treatments recommended for these plants at different seasons.

In general it has been found that the amount of anesthetic or other toxic substances to be used varies with the season of the year in which the plant is treated, the period of exposure, the temperature of the enclosed air, and the class of plants used. In the early and after rest periods, the dosage used should be less than during the early portion of the middle rest period. The best temperature at which to treat the plants is in the neighborhood of 60° F., although it may vary between 55 and 65° without materially influencing the

results. If higher temperatures prevail, the dosage, or the period of treatment, or both, should be reduced accordingly. They should be increased where lower temperatures occur.

The work as a whole is summarized as follows:

"Anesthetics, when properly applied to plants in a state of complete rest, impart a decided growth impulse.

"Toxic substances such as alcohol, acetone, and other similar agents, while not causing insensibility unless employed in large amounts, act much the same as do anesthetics and cause a more or less decided growth acceleration. The application of frost and vacuum result in some instances in accelerated growth, while in others negative results are obtained.

"Ether and chloroform seem to afford the most satisfactory results with lilacs; while ethyl iodid and ethyl bromid yield a better outcome with astilbe and with lily-of-the-valley than do such other materials as have been used.

"Lilacs are most effectively treated prior to December 1. After this date the growth acceleration is less marked. Apparently the lily passes from the middle rest to the after rest period during the latter part of November.

"Astilbe treatments made after January 1 were much less effective in accelerating growth than those made prior to this date. The time of passage to the after rest period is assumed to be in the latter part of December.

"The effect of anesthetics and other substances upon bulbous plants was not sufficiently definite to warrant deduction.

"The desiccating effect of ether and chloroform upon bulbs was more marked than that secured with methyl alcohol and acetone."

Frequent reference is made to the results of other investigators and a partial bibliography on the use of anesthetics in plant forcing is appended

Smudge pots for the prevention of frosts, Wichita, Kans., R. H. SULLIVAN (*Mo. Weather Rev., 38 (1910), No. 3, pp. 412, 413, figs. 2*).—A brief account is here given of tests of smudge pots in two apple orchards near Wichita, Kans., during the spring of 1910.

In one case 79 pots and in another 50 pots were used per acre. "The figures show that with from 70 to 80 pots to the acre a fruit crop can be saved when the temperature falls to 25°, or even to 22°, if the work is done thoroughly and systematically." Observations showed that the most damaging temperatures occurred after the wind had died down. The author is of the opinion that "artificial preventive methods can be used effectively despite the oft-repeated arguments that it is too windy in Kansas."

[Keeping tests of onions], J. W. CROW (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 148, 149*).—A number of varieties of onions were stored for a period of 206 days, beginning October 3, 1908. The majority of the varieties kept in nearly sound condition, the exceptions being the Early Rose, Red Tripoli, Giant Brown Rocca, and Gibraltar, of which only 12, 14, 22, and 63 per cent respectively were good.

The fertilization of apple orchards, J. P. STEWART (*Pennsylvania Sta. Bul. 100, pp. 3–28, pls. 6*).—This bulletin contains the results for the third season of the orchard experiments started by the station in 1907 (E. S. R., 21, p. 237), reviews the experiments as a whole, and offers practical suggestions relative to orchard management in Pennsylvania.

In the orchards where the fertilizer experiments are being conducted alone, nitrogenous manures continue to show beneficial effects on yield and growth with the usual harmful influence on color. Raw phosphate and lime are still proving unsatisfactory, except as to color for the phosphate and as to growth for the lime. As a general thing the plats making the best yield have also made the best growth.

The results thus far indicate that differences in season and therefore differences in the moisture supply must be taken into consideration in determining the value of different fertilizer treatments. Practically none of the treatments have materially improved the color of the fruit, while a number of them have distinctly decreased it. The author concludes that the kind of pruning and the degree of maturity obtained before picking are the chief means at the disposal of the orchardist for affecting the amount of color in fruit. As compared with the unfertilized plats, the fertilized plats gave net gains in the third year of from \$124.75 to \$267.55 per acre, thus indicating for these experiments that plant food was a limiting factor.

In the soil management experiments, the sod mulch system has proved most satisfactory in the young orchards as to yield and size of fruit, second to sod as to color, and slightly behind clean tillage as to growth. The mulch system has surpassed the cover crop method in every way. In the mature orchard, however, tillage with a cover crop for 3 years has been superior to sod mulch in yield and growth, although the mulched fruit excels in color by more than 30 per cent and in average size of apples by about 6 per cent. The last fact appears to be connected with the smaller crop on the mulched trees.

Fertilized plats were also included in the soil management experiments. The applications of plant food appear to reduce strongly or even nullify the differences due to cultural methods. In some cases there was a consecutive increase in productiveness following the addition of plant food. The data thus far secured indicate that with equal values of manure and a proper commercial fertilizer, the manure gives the best results on sod or mulched areas, and the commercial fertilizer gives the best results when used in connection with tillage. From the work as a whole, it appears that manures used in both young and old orchards reduce the color and increase the size of the fruit and tree growth. In the old orchard, manure shows some advantage over commercial fertilizers in tree growth and in size of apples with effects reversed in the young orchards.

The author submits summarized data furnished by W. P. Brooks of the Massachusetts Station, showing the treatment and total yields per acre from fertilizer experiments with apples, conducted by that station from 1889 to 1910. In every case the treated plats have proven superior to the untreated. The manure plat which alone received nitrogen in quantity is superior in yield and growth but ranks only just above the check plat in quality. This work also indicates that it is best to use the potash in the sulphate form.

Orchard fertilization, J. P. STEWART (*Proc. State Hort. Assoc. Penn., 51 (1910), pp. 104–121, figs. 2*).—The subject matter of this paper is essentially similar to that of the bulletin above noted.

Thinning of table grapes, F. T. BIOLETTI (*Pacific Rural Press, 79 (1910), No. 24, pp. 461, 463, figs. 3*).—The author describes in detail the method employed in thinning table grapes in the California vineyards and enumerates the good results secured from this practice, especially with the Tokay grape, the thinning of which variety results in short in a general improvement of appearance, quality and transportability without in most cases increasing the net cost of production and leaving the improvement in quality as clear gain.

Fertilizer experiments with grapes, K. WINDISCH (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 19, pp. 278–281*).—The results are given of fertilizer experiments conducted during 1909 in a number of vineyards in Würtemberg.

Activities of the Macomer royal nursery of American grapes for the period 1897 to 1909, C. LIUZZI (*Bol. Min. Agr., Indus. e Com. [Rome], 9 (1910), Ser. C, No. 3, pp. 5–68*).—A general review with tabular data showing the work accomplished in testing, propagating, and distributing American

grape species and hybrids with a view of reconstituting the phylloxera infested vineyards in Sardinia.

Coffee from grower to consumer, B. B. KEABLE (*London, pp. VIII+120+40, pl. 1, figs. 22, map 1*).—A popular treatise on this subject.

[Cacao manurial plats in Dominica], F. WATTS (*Imp. Dept. Agr. West Indies Rpts. Bot. Sta. Dominica, 1908–9, pp. 18–29*).—This is a progress report of the fertilizer and mulching experiments being conducted with cacao at the Botanic station, including the results of fertilizer experiments in several county districts.

The results as a whole confirmed those previously reported (E. S. R., 20, p. 338). The use of grass and weeds as a mulch has given the highest returns both in quantity and value. All of the fertilized plats have yielded better than unmanured plats, the complete fertilizer plat yielding next to the mulched plat. Thus far the experiments have given no evidence as to the value of potash and phosphate independently of each other, but as the soils of Dominica are well supplied with potash, it does not appear that this element is needed badly.

[Varieties of fruit for North Tyrol] (*In Bericht über die 25 jährige Tätigkeit der Landwirtschaftlichen Landesanstalt Rotholz von ihrer Grundung im Jahre 1879 bis 1904. Innsbruck, 1904, pp. 76–82, fig. 1*).—With the observations made in the Rotholz Station orchards and elsewhere throughout North Tyrol as a basis, a list is given of varieties of fruits and nuts recommended for planting in that country.

The ornamental trees of gardens and parks, H. JÄGER and L. BEISSNER (*Die Ziergehölze der Gärten und Parkanlagen. Weimar, 1889, 3. ed., pp. X+629*).—This is a handbook for private and commercial gardeners and nurserymen, containing alphabetically arranged descriptions, together with notes on the culture and uses of ornamental trees and varieties which grow in the open in Germany and countries with similar climates. Consideration is also given to utilizing the trees for other purposes, nursery and plantation work, and the acclimatization of trees.

Beautiful flowers and how to grow them, H. J. and W. P. WRIGHT (*London, 1909, vols. 1, pp. VIII+200, pls. 50, figs. 61; 2, pp. VIII+202, pls. 50, figs. 83*).—This is a popular treatise on the culture, varieties, etc., of roses, bulbs, hardy herbaceous plants, rockery plants, greenhouse, conservatory, and hothouse flowers, window and room plants, carnations, dahlias, sweet peas, annuals, aquatic plants, plans and plants for arches, pergolas, pillars, stumps, walls, and fences, orchids, chrysanthemums, tender bedding plants, and flowers for suburban gardens. Each volume is illustrated by plates in full color from paintings by various artists.

The home garden, E. F. HITCHINGS ET AL. (*Bul. [Maine] Dept. Agr., 9 (1910), No. 2, pp. 29–70*).—A popular bulletin composed of a number of special articles on various phases of gardening.

FORESTRY.

Annual report of the department of forestry, A. CARY (*Separate from N. Y. State Forest, Fish and Game Com. Ann. Rpt., 15 (1909), pp. 45–78, pls. 5*).—This consists of a summarized report of the operations of the different divisions of the New York state department of forestry for 1909. The subject matter is discussed under the general headings of blister rust of pines, the Highlands of the Hudson Forest Reservation (see below), law requiring lopping of tops, forest fires, forest products, forest reserves, cooperation with owners of woodland, forest schools, and miscellaneous features of the work.

For the year ended November 15, 1909 a total of 11,759 acres of woodland throughout the State was burned over, destroying standing timber valued at $10,263,000, as well as cordwood and logs valued at $11,862,000. The total output of the forest and woodland of the State for 1908 was 1,091,164,706 ft. b. m.

The Highlands of the Hudson Forest Reservation, F. F. Moon (*Separate from N. Y. State Forest, Fish and Game Com. Ann. Rpt., 15 (1909), pp. 103–121, pls. 12, map 1*).—This report contains the text of the law establishing the above reservation, together with a description of the region included relative to general conditions, forest types, ownership, past management, a list of species native to the reservation, suggestions for woodland management, and methods of regeneration.

Reforesting operations, C. R. Pettis (*Separate from N. Y. State Forest, Fish and Game Com. Ann. Rpt., 15 (1909), pp. 122–167, pls. 17, map 1*).—A report for the year relative to the operation of the state forest nurseries, the reforestation of state land, assistance rendered private land owners, distribution of trees, and experimental work under way.

In order to supply the demand for planting-stock for reforesting at a reasonable price, large quantities of white pine plants were imported from Germany. As a result it was found that the European blister rust (*Peridermium strobi*) had been introduced into the Lake Clear nursery. Measures have been taken for its prompt eradication there and elsewhere where the plants were distributed.

Some data are given on the trial of the seed spot method of artificial reforesting. In this method the seed is sown in little spots about 1 ft. in diameter regularly over the field that is to be reforested. Out of 2,231 seed spots made in 1906 and 1907 of various species an average of 35 per cent now have trees. The cost of this method is about $10 per acre.

The Louisiana forestry law (*Lumber Trade Jour., 58 (1910), No. 1, pp. 17, 18*).—The text is given of the Louisiana forestry law as passed during 1910.

A study of forest conditions of southwestern Mississippi, J. S. Holmes and J. H. Foster (*Miss. Geol. Survey Bul. 5, pp. 56, map 1*).—This is a report of the cooperative study of the Forest Service of the U. S. Department of Agriculture and the State Geological Survey relative to forest conditions in the southwestern counties of the State. It includes a description of the several types of forest, a summary of the forest and economic conditions of each of the counties covered, and a review of the timber industries in the region. Plans for the conservative management of private and public forest lands are outlined, and recommendations are made for a definite forest policy for Mississippi. A map of the region studied accompanies the report.

The cost of forest mapping and estimating in Montana, K. W. Woodward (*Forestry Quart., 8 (1910), No. 2, pp. 147–157, pl. 1*).—A detailed examination of the cost of mapping and valuing the holdings of the Northern Pacific Railroad Company within the National Forests of Montana is reported. The total cost per acre averaged 2¼ cts.

Yield tables of western forests, E. I. Terry (*Forestry Quart., 8 (1910), No. 2, pp. 174–177*).—In view of the lack of published yield tables, tables based upon admittedly scanty data are presented for western yellow pine, western larch and Douglas fir. The tables refer to northern Rocky Mountain conditions.

The effect of grazing on forest conditions in the Caribou National Forest, E. R. Hodson (*Forestry Quart., 8 (1910), No. 2, pp. 158–168*).—The author discusses the relation between the grazing industry and the silvicultural interests of a forest and points out the limitations of an intense form of grazing in the average forest such as the above.

Lopping branches in lumbering operations, J. W. STEPHEN (*Separate from N. Y. State Forest, Fish and Game Com. Ann. Rpt. 15 (1909), pp. 94–102, pls. 4*).—In this report the author explains the necessity for lopping branches in lumbering operations, cites some of the results which have been obtained favorable to lopping, and draws conclusions relative to the advantages of this practice. As far as the Adirondack forests are concerned, lopping appears to lessen the danger from fire, promotes reproduction and the closer utilization of wood, and lessens the labor of guttering and skidding.

Note on best season for coppice fellings of teak (Tectona grandis), R. S. HOLE (*[Indian Forest Dept.] Pamphlet 16, Bot. Ser. 1, pp. 29*).—This paper gives the results of experimental coppice fellings commenced by the Jubbulpore Forest Division of the Central Provinces in 1906, together with suggestions relative to methods of procedure in conducting such experiments.

A note on the fissibility of some Indian woods, R. S. TROUP (*Indian Forest Rec., 2 (1909), No. 2, pp. 29–73, pls. 2*).—Data are reported of splitting tests conducted with 61 different species of Indian woods. The tests are described and illustrated.

[On the development of adventitious roots on old tree stems], VOGTHERR (*Forstw. Centbl., n. ser., 32 (1910), No. 6, pp. 305–316, pls. 2*).—The author reviews the literature relative to adventitious root development on the aerial parts of old trees and cites many instances which have come under his own observation.

The greening of fresh linden wood, F. W. NEGER (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 6, pp. 305–313, figs. 2*).—The author reports that the greenish hue which fresh cut linden or bass wood assumes in a few days' time is due to chemical reaction rather than to fungi of any kind. When the surface of a piece of linden wood is treated with a solution of oxalic acid the green color disappears very shortly, which leads the author to conclude that the color is one of the iron-tannin combinations.

His investigations also included a study into the origin of this coloring matter. From the results it appears that linden wood is generally rich in iron and that the discoloration is more marked when the wood is especially rich in this element.

DISEASES OF PLANTS.

Contributions to the life history and structure of certain smuts, B. F. LUTMAN (*Abs. in Science, n. ser., 31 (1910), No. 802, pp. 747, 748*).—On account of the recent discoveries in the sexuality of rusts the author has attempted to discover whether similar phenomena occur in some of the smuts. It was noticed that the mature teleutospores of all smuts were uninucleated, but that there were two nuclei in the younger spores of the Tilletiaceæ and possibly also in the Ustilaginaceæ. This would seem to indicate that the smuts of the Tilletia group are more nearly related to the rusts than those of the Ustilago group.

The complete life history of the oat smut was investigated, and it was found that the promycelial cells were uninucleated. The conidia were also uninucleated, but they became multinucleated immediately after putting out a germ tube. Infection occurred in from 3 to 5 days and the entire tip of the seedling was full of the intercellular mycelium. This mycelium broke up into spores when the rudiments of the flowers appeared.

Origin of heterœcism in the rusts, E. W. OLIVE (*Abs. in Science, n. ser., 31 (1910), No. 799, pp. 639, 640*).—A discussion is given of the various views regarding the origin of heterœcism in rusts, and the author suggests the possibility that at one time the barberry may have acted as an ancestral host to the teleutospores of *Puccinia graminis*.

The wintering over of summer conidia of pathogenic Ascomycetes and their resistance to cold, R. EWERT (*Ztschr. Pflanzenkrank., 20 (1910), No. 3, pp. 129–141, fig. 1*).—In germination experiments with the wintered-over summer conidia of *Mycosphærella sentina* and *Pseudopeziza ribis*, many of the conidia were found to be viable, but infection experiments with them gave negative results, due, the author thinks, to the inoculation method used. Summer conidia of *M. sentina*, *P. ribis*, *Fusicladium dendriticum*, and *F. pirinum*, subjected from 1 to 3 times to temperatures ranging from —5° to —15° C. for several hours at each exposure, uniformly gave good results as to viability.

As a result of these experiments, the author claims that these wintered-over summer conidia are undoubtedly capable of infecting their proper hosts the following spring.

Sooty molds, R. WOY (*Prakt. Rathgeber Obst. u. Gartenbau, 1909, p. 301; abs. in Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 1, p. 58*).—For combating the sooty molds and mildews that cover with a dark mycelium the leaves of various plants growing in hothouses, the author recommends better ventilation of the houses and the frequent washing of affected plants with soapy water.

Fungi causing diseases of cultivated plants in the West Indies, C. K. BANCROFT (*West Indian Bul., 10 (1910), No. 3, pp. 235–268, pl. 1*).—Brief descriptive accounts are given of the various fungi which have been reported as injurious to cultivated plants in the West Indies.

The diseases are dealt with in the order of the systematic classification of the fungi. After a description of the different parasites some of the more important literature relating to them is given, so that further information may be obtained regarding the different species. The list has been supplemented by additions by F. W. South, bringing the information more up to date.

In appendixes notes are given on bacterial diseases and a discussion is presented of the relationship between *Trichosphæria sacchari* and *Thielaviopsis ethaceticus*. A discussion is also given of the nomenclature of *Diplodia cacaoicola* and its allies.

Legislation in the West Indies for the control of pests and diseases of imported plants, H. A. BALLOU (*West Indian Bul., 10 (1910), No. 3, pp. 197–234*).—A compilation is given of the laws and regulations relating to the importation of plants to prevent the introduction of insect pests and fungus diseases.

The control of the loose smut of grains, K. STÖRMER (*Landw. Wchnschr. Sachsen, 12 (1910), No. 12, pp. 91, 92*).—This is a discussion of disputed points as to the reasons for the better results obtained in the hot water treatment by soaking the grain at a higher temperture than was formerly considered necessary.

A barley disease, L. H. PAMMEL, CHARLOTTE M. KING, and A. L. BAKKE (*Abs. in Science, n. ser., 31 (1910), No. 799, p. 639*).—The authors report a parasitic disease of barley which was observed during the early part of July, 1909. The disease manifests itself in the form of brownish circular or somewhat elongated dark-colored spots, and the leaves soon become brown. Cultures and inoculation experiments demonstrated that the fungus was parasitic upon barley and also upon corn. It is believed to differ from *Helminthosporium teres* and *H. turcicum*.

Present status of the cotton anthracnose investigations at the South Carolina Experiment Station, H. W. BARRE (*Abs. in Science, n. ser., 31 (1910), No. 799, p. 638*).—This paper gives a summary of the investigations on the cot-

ton anthracnose, a more extended account of which has been given elsewhere (E. S. R., 22, p. 648).

Notes on bacterial blight in cotton, J. S. J. McCall (*Nyasaland Agr. and Forestry Dept. Bul. 2, 1910, pp. 4*).—According to the author, the bacterial disease of cotton (*Bacterium malvacearum*) has proved one of the most destructive diseases of Egyptian cotton in Nyasaland, some estates reporting losses amounting to as much as 60 per cent.

The disease was first observed in 1909 on rattoon cotton and later was found in a number of localities. Egyptian and Sea Island cottons seem to be particularly subject to the disease, but certain varieties of American Upland cotton have developed a high degree of resistance. Nyasaland Upland cotton and a hybrid cotton resulting from a cross between American and Egyptian varieties have shown marked resistance.

The location in which cotton is grown seems to have an effect upon the presence of the disease, and it is advised that Egyptian cotton should not be grown on lowlands adjoining rivers. It is recommended that all cotton plants be uprooted and burned immediately after picking and that the practice of rattooning, especially on river plantations, be avoided. Seed from diseased plantations should be soaked for an hour in a solution of corrosive sublimate or formalin.

Studies on the parasitic fungi of rice in Japan, J. Miyake (*Bot. Mag. [Tokyo], 23 (1909), Nos. 266, pp. 85–101; 267, pp. 127–154; abs. in Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 16–17, pp. 476, 477*).—This gives a list of fungi parasitic on rice in Japan, of which the following are described as new: *Melanomma glumarum*, *Mycosphærella* (*Sphærella*) *shiraiana*, *M.* (*S.*) *hondai*, *Phæidia oryzæ*, *Phæosphæria oryzæ* n. g. and n. sp., *Leptosphæria iwamotoi*, *Ophiobolus oryzæ*, *Pleospora oryzæ*, *Gnomonia oryzæ*, *Phyllosticta japonica*, *P. miurai*, *Chætophoma glumarum*, *Coniothyrium japonicum*, *C. brevisporum*, *C. anomale*, *Sphæropsis japonicum*, *Sphæronema oryzæ*, *Diplodia oryzæ*, *Diplodiella oryzæ*, *Hendersonia oryzæ*, *Septoria longispora*, *S. curvula*, *Phæoseptoria oryzæ*, *Dinemasporium oryzæ*, *Cladosporium oryzæ*, *Cercospora oryzæ*, *Epicoccum hyalopes*, and *Epidochium oryzæ*.

The black scab of the potato, J. Ritzema Bos (*Tijdschr. Plantenziekten, 16 (1910), No. 1–2, pp. 59–64*).—After calling attention to the gradual dissemination of this disease (*Chrysophlyctis endobiotica*) throughout European countries, especially in England, and the great damage to the potato industry wherever it has obtained a foothold, the author warns the potato growers of the Netherlands to guard against its introduction by avoiding the use of foreign seed potatoes. Any suspicious cases should be examined by a competent inspector and if diseased with the black scab the entire lot should be used as stock food.

The prevention and control of the potato wart disease, H. Jösting (*Deut. Landw. Presse, 36 (1909), No. 88, p. 941, fig. 1*).—For the control of this disease the author recommends the use of healthy seed potatoes, crop rotation, collecting and burning badly diseased tubers, and the feeding of slightly infected potatoes to stock after the tubers have been cooked.

Some of the more important contributions in 1909 on the diseases of sugar beets and potatoes, A. Stift (*Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 18–19, pp. 520–560*).—A critical review is given of some of the more important contributions that appeared in 1909 relating to the insect pests and fungus diseases of sugar beets and potatoes. The literature reviewed is almost all from German sources.

Diseases of sugar beets, O. Fallada (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 1, pp. 42–48, figs. 2*).—Brief notes are given on the diseases observed on sugar beets in Austria-Hungary during 1909. Among those

noted are the root disease due to *Phoma betæ*, heart or dry rot, beet scab, bacteriosis, root rot due to *Rhizoctonia violacea*, root tumor, several of the abnormal root developments, the occurence of dodder (*Cuscuta europea*) on beets, and the leaf diseases, such as those caused by *Cercospora beticola*, *Clasterosporium putrefaciens*, and the albinism of beet leaves.

The diseases of the sugar beet during 1909, K. STÖRMER (*Bl. Zuckerrübenbau, 17 (1910), No. 5, pp. 88–93*).—This is a general discussion of the sugar beet industry in connection with its insect and fungus enemies.

The insects noted as injurious during the year were the cutworm (*Agrotis* sp.), leaf louse, and carrion beetles (*Silpha atrata* and *S. opaca*).

Of the fungus pests, false mildew (*Peronospora schachtii*) and root disease (*Pythium debaryanum*) did considerable damage. The experiments conducted indicate that the deficiency of lime and phosphoric acid in the soil was a favorable condition for the development of the latter, and mixtures of lime and kainit are recommended as a remedy. For the control of heart or dry rot of beets, well-drained soil to which has been added gypsum to neutralize the alkaline condition of the soil and leave it physiologically acid, is recommended. For the beet wilt due to the beet nematode (*Heterodera schachtii*), which was also present, crop rotation and soil disinfection with carbolineum are recommended. Poor physical condition of the soil, especially if deficient in lime, seems to favor this disease.

The cause and control of beet diseases in Posen and West Prussia, R. SCHANDER (*Deut. Zuckerindus., 34 (1909), No. 6, pp. 121–124; abs. in Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 8–9, pp. 309–311*).—It is stated that root disease and heart or dry rot are the two main enemies to sugar beet culture.

Phoma betæ is given as the usual cause of the first disease, and it is most prevalent on seedlings. Experiments in seed disinfection for this disease were not successful, and the author claims that the drying and crusting over of the soil during the germination and early growth of the seedlings weakens them and contributes to the disease. The kind of fertilizer, especially the form of nitrogen used, was found to influence the development of the disease. Lime nitrogen had the least effect, while calcium nitrate was the most effective, with Chili saltpeter next. Liquid manure was also found to give good results against the disease.

The heart or dry rot is claimed to be due to physiological causes, these attacking the beets at the time of greatest growth. It always appears after a period of great heat and dryness. The character of the soil and kind of culture and fertilizers used are given as factors in producing this disease.

The root diseases of beets, W. BUSSE and P. ULRICH (*Mitt. K. Biol. Anst. Land u. Forstw., 1909, No. 8, pp. 21–24*).—A review is given of the work done by the authors on the root diseases of beets during 1906–1908 (E. S. R., 19, p. 347; 20, p. 546), with reference to their causes and control by seed treatments, fertilizers, and resistant varieties. The probable influence that the physical properties of the soil may have on the occurrence of these diseases is noted.

Root tumors on sugar beets, J. REINELT (*Bl. Zuckerrübenbau, 16 (1909), No. 21, pp. 328–330; abs. in Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 16–17, p. 479*).—This is a continuation (E. S. R., 21, p. 446) of the discussion as to the cause of root tumors on sugar beets, in which the author concludes that no contagious source can be assigned for this trouble and that the impulse for tumor formation does not come from the environment but from the beet itself.

The heart or dry rot of beets, W. BUSSE and P. ULRICH (*Mitt. K. Biol. Anst. Land u. Forstw., 1909, No. 8, pp. 24, 25*).—This is a brief summary of experiments conducted with different varieties of sugar and common beets in regard to their resistance to this rot. Saltpeter and ammonium salts were

tested as to their effects on this disease, the ammonium salts showing no appreciable advantage over the saltpeter. The physical condition of the soil as a probable factor in the cause of the disease was also studied.

Premature seed formation in beets, M. GONNERMANN (*Bl. Zuckerrübenbau, 16 (1909), Nos. 21, pp. 321–327; 22, pp. 342–348; abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 26 (1910), No. 16–17, pp. 748, 749*).—The author claims that the premature formation of the flower stalks of the sugar beets during the first year of growth is an acquired habit produced in the development of the sugar beet from the common beet, aided by temperature, weather conditions, and the early planting of the seed. Beet seed from premature one-year stalks when planted late rarely developed the premature seed stalks, but produced a large yield in weight and sugar content.

The premature seed formation of the sugar beet, H. BRIEM (*Ztschr. Zuckerindus. Böhmen, 34 (1909), No. 3, pp. 169–171; abs. in Centbl. Bakt.* [*etc.*], *2 Abt., 26 (1910), No. 16–17, p. 479*).—The author discusses the supposed causes of the premature seed stalk formation of the sugar beet during the first year of its growth. It is stated that this premature growth usually appears after a long, dry summer, followed by warm, wet weather about the middle of September. This starts the plant cells into renewed activity, and a consequent seed stalk formation occurs.

The stinking smut of wheat and its control (*Landw. Ztschr. Rheinprovinz, 10 (1909), No. 40, pp. 585, 586*).—This is a popular discussion of this smut, together with a description of the various well-known methods used for its control.

The bacterial soft rots of certain vegetables, H. A. HARDING, W. J. MORSE, and L. R. JONES (*Vermont Sta. Bul. 147, pp. 243–360, figs. 10*).—This reports cooperative work with the New York State Station, and has been noted as Technical Bulletin 11 of that station (E. S. R., 22, p. 649).

The wilt disease of melons, E. PANTANELLI (*Italia Agr., 45 (1909), pp. 221–224; Abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 26 (1910), No. 8–9, p. 292*).—Attention is called to the increasing prevalence and severity of this disease, which has been known for a number of years in Italy under different names, and which threatens serious injury to various cucurbit crops, especially cucumbers. The cause is supposed to be *Fusarium niveum.*

A bacterial soft rot of muskmelon, caused by Bacillus melonis n. sp., N. J. GIDDINGS (*Vermont Sta. Bul. 148, pp. 363–416, figs. 14*).—An account is given of a soft rot of the muskmelon caused by a bacillus, in which the pathological history and morphological, cultural, physical, and biochemical characters are described.

This disease was first called to the author's attention in 1907, and a considerable loss of Montreal muskmelons due to this cause reported (E. S. R., 20, p. 345). The organism causing the disease was isolated and cultural and other experiments conducted with it, from which the author concluded that it is capable of developing as a wound parasite not only upon the muskmelon but upon several other host plants. Its behavior in cultures indicated that it could live indefinitely as a saprophyte under favorable conditions.

In connection with the investigation an attempt was made to control the disease, and as a result the author recommends spraying with Bordeaux mixture as a general preventive, supporting the melons so as to keep them from contact with the soil, and the immediate removal of all diseased melons from the field. It is thought that probably a field in which the rot has been seriously prevalent should not be used for at least three years, to avoid the possibility of infection.

It is believed that ordinarily there will be little trouble experienced from this disease during continuously dry seasons, but the danger is increased in wet seasons, or if heavy rains follow a dry period.

A bibliography is appended.

A spinach disease caused by Heterosporium variabile, H. S. REED (*Abs. in Science, n. ser., 31 (1910), No. 799, p. 638*).—A brief account is given of a serious leaf spot found on spinach in the trucking region about Norfolk, Va., in 1909. An investigation showed that the disease was due to *H. variabile.* The fungus apparently occurs only when other fungi have previously attacked the leaves, but the fungus hyphæ when once within the leaves spread in a rapid manner. The investigations apparently confirm previous views regarding the weak parasitism of this species.

The mint rust, E. NOFFRAY (*Jour. Agr. Prat., n. ser., 19 (1910), No. 5, pp. 150-152*).—This is a popular description of the rust *Puccinia menthæ*, which is found on various members of the mint family, especially on the cultivated species, *Mentha piperita* and *M. citrata*, together with suggestions as to its control, such as the destruction of the leaves on which the æcidia are borne, spraying with Bordeaux mixture, and burning the leaves which are infested with the teleutospores late in the fall.

Chlorosis of fruit trees, G. RIVIÈRE and G. BAILHACHE (*Prog. Agr. et Vit. (Éd. l'Est-Centre), 31 (1910), No. 15, pp. 453, 454*).—Attention is called to the fact that while pear trees are successfully grown on sandy loam soil, they grow less satisfactorily on those soils containing considerable lime. This is particularly true of pears grafted on quinces, these trees seeming to suffer severely from chlorosis.

An investigation was undertaken to determine the proportionate amount of calcium carbonate that soils could contain without its being injurious to pear trees grafted upon quince stock. As a result of the investigations the authors found that a content of more than 40 gm. of calcium carbonate per kilogram of soil would prove injurious. In their experiments where the proportion of lime was 10 gm. to 1 kg. of soil there was no evidence whatever of chlorosis. Where the amount was increased to 40 gm. there was a slight indication of disease, and this was much more conspicuous where the lime content amounted to 170 gm. per kilogram of soil. Where the quantity of lime amounted to 280 gm. the planting of pear trees in such a soil was quickly followed by their death.

The dying of fruit trees, J. MÜLLER and K. STÖRMER (*Deut. Obstbau Ztg., 1910, No. 7-8, pp. 81-87, figs. 5*).—Attention is called to the dying of cherry, apple and other fruit trees, in which the following symptoms are usually seen: Wilted, yellowish leaves, meager foliage, shedding of the unripe fruit, deficient ripening of the fruit on the trees, death of the bark on the trunk and larger branches, death of twigs, and finally the death of each branch and of the entire tree. Associated with the disease, on stone fruits in particular, is the appearance of gum mainly on the dying bark. A cross section of the diseased limb where the bark is dying shows that the underlying heart and sap wood is colored. This discoloration may be traced from the roots to the smaller branches and twigs, but here the coloring is mainly in the inner heart wood, while the young sap wood, cambium, and bark are as yet sound and healthy. On following the coloring down into the roots, the cross section of the diseased wood is seen to become less, finally ending in a dead root, usually the taproot, while the lateral roots may be healthy.

This inner coloring of the heart wood seems to be due to bacteria which attack the old and dead cells and spread outward in the older branches toward the bark. On trees thus diseased are found a species of fungus belonging to

the genus Valsa (Cytospora), but the author claims that neither the bacteria nor the fungus is the primary cause of the death of the trees but that unfavorable environment and weather and soil conditions weaken the resistance of the trees until these parasites are able to gain a permanent foothold and finally cause the death of the trees.

Recommendations as to proper soil conditions, cultivation, fertilizers, soil disinfection, and other points are given.

[Orchard diseases], C. J. S. BETHUNE (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 34–36*).—Experiments were conducted with commercial lime-sulphur mixtures in combating the apple scab (*Venturia inæqualis*) and the pear scab (*V. pirina*). For the apple scab the trees were sprayed (1) just before the blossoms opened with a 1:25 lime-sulphur solution, (2) just after the blossoms had fallen with a 1:40 solution, and (3) 3 weeks later with a 1:40 solution. Ninety-nine per cent of the fruit from the sprayed trees was free from scab, none was russeted, and the foliage was uninjured, except by the first 1:25 spray, which burned the leaves a little around the tips.

For pear scab 4 applications were given of the lime-sulphur spray, (1) just before the buds began to burst with a 1:9 solution, (2) just after the buds had opened and before the blossoms had appeared with a 1:25 solution, (3) just after the blossoms had fallen with a 1:40 solution, and (4) 3 weeks later with a 1:40 solution. The fruit and leaves were absolutely free from scab on the sprayed trees, while on the surrounding untreated trees both fruit and leaves had a considerable amount of scab. The 1:25 solution burned the leaves slightly, but not the 1:40.

Experiments were also conducted on the control of black rot cankers (*Sphæropsis malorum*) on the trunks and large branches of apple trees. The results indicate that this disease can be successfully controlled by (1) thoroughly pruning the orchard early in the spring, cutting out and burning all dead branches; (2) cutting out the cankers found on the trunk and main branches, being certain that all the diseased bark is removed, disinfecting the wounds with corrosive sublimate 1:1000, and painting with white lead free from turpentine; (3) spraying all apple and pear trees at least 3 times with either home boiled lime-sulphur or Bordeaux mixture, applied before the buds burst, just before the blossoms open, and just after the blossoms have fallen. A fourth application of the same spray 2 or 3 weeks after the third spraying may prove helpful.

A further study of the gumming of peach trees indicates that while inoculations of the trunk and branches with the spores of brown rot (*Sclerotinia fructigena*) produced typical gum exudations, this fungus can not be considered as the primary cause of the gumming as a whole. Cultures with the diseased wood from around freshly formed gum masses gave no organisms in most cases, and in those instances in which an organism was grown in any of the media, inoculations with it failed to produce gum exudations from healthy trees.

Black rot canker (Sphæropsis malorum), S. B. MCCREADY (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 41, 42*).—An investigation of the black rot canker in Ontario shows that it is the prevailing apple tree canker, being widespread in Ontario and Quebec and apparently more severe in the colder and more exposed sections. It was found attacking the trunk, branches, leaves, fruit, and occasionally the twigs.

It is claimed that this disease can be controlled by good cultivation, thorough spraying, the careful cutting out of all cankers, and the destruction of all diseased rubbish, as was demonstrated during the year by numerous growers.

Plant diseases, D. H. JONES (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 128–130*).—During 1909 the bacterial blight of apple and pear trees was very severe in Ontario. Many pear trees were killed, and a large percentage of the young growth of apples was withered and destroyed.

It is claimed that 50 per cent of the total amount of the twig blight on apple trees, and practically all cases of twig blight that occurred after the blossoming season, were due to the inoculation of the disease germs into the twigs, suckers, and water spouts by aphids, principally *Aphis mali* and *Schizoneura lanigera*. It is also claimed that the body blight on the trunk and large branches may result from the inoculation of the wounds made by the fruit bark boring beetle (*Scolytus rugulosus*), as the beetles were found to be literally covered with blight germs and the disease was found developing around fresh punctures made by these beetles in the bark of healthy trees.

For the control of this disease rigorous pruning, disinfection of wounds, and pruning implements, and the destruction of the aphids, beetles, etc., are recommended.

The pear and apple blight in Montana, D. B. SWINGLE (*Montana Sta. Circ. 2, pp. 9*).—The author traces the appearance and distribution of the bacterial blight of apples and pears throughout Montana, describes the cause and symptoms of the disease, and offers suggestions for its prevention.

The method of treatment suggested consists of the cutting out and burning of all affected parts, care being taken to disinfect the implements used in pruning. In the regions covered by this circular it is considered important that orchards should have no more tillage or water during the first half of the growing season than is absolutely necessary for making the crop.

Lists are given of different varieties of apples grown in Montana, these being arranged with reference to their resistance or susceptibility to disease. The author suggests that where susceptible varieties have already been planted they should be top worked with more resistant varieties as soon as the blight becomes serious enough to warrant it.

The use of lime-sulphur sprays in the summer spraying of Virginia apple orchards, W. M. SCOTT (*Virginia Sta. Bul. 188, pp. 16, figs. 8*).—An account is given of experiments with lime-sulphur sprays conducted in Virginia in cooperation with the Bureau of Plant Industry of this Department, the more essential features of which have been noted elsewhere (E. S. R., 23, p. 51).

The experiments were carried on with a number of varieties of apples in different orchards, and it was found that the lime-sulphur preparation, in the self-boiled or other form, was quite efficient in the control of the apple diseases. It is apparently as effective as Bordeaux mixture for the control of apple scab, will also control leaf spot and some other diseases, but has not proved satisfactory for apple blotch and bitter rot. In regions where spraying for bitter rot is required, it is recommended that the lime-sulphur treatment for scab and leaf spot be followed by applications with Bordeaux mixture.

A new species of Endomyces from decaying apple, C. E. LEWIS (*Maine Sta. Bul. 178, pp. 45–64, pls. 7*).—In October, 1908, the author discovered a new fungus in connection with a study of the decay of apples, a preliminary account of which has been given elsewhere (E. S. R., 23, p. 250). This fungus was associated with a number of others, including species of Alternaria, Cladosporium, and Fusarium, and when studied in cultures proved to be a species of Endomyces.

Inoculation experiments showed that the decay could be readily induced by the introduction of the fungus from pure cultures. Its chief interest lies in the fact that it belongs to a family of fungi which has not hitherto been reported from America. The fungus differs somewhat in its characters from the de-

scribed species, hence the author gives it the name *E. mali* n. sp., the morphological and cultural characters of which are described.

Researches on gum flow and frost injuries to cherry trees, P. SORAUER (*Landw. Jahrb., 39 (1910), No. 2, pp. 259–298, pls. 5*).—This is a general investigation of the various factors that produce gummosis in cherry trees, in which the author discusses individual variations in the normal growth of twigs, the flow from gum centers in uninjured branches, the predisposition to gummosis of certain tissue groups in healthy branches, and the relation of frost and tension differences to gummosis.

Peach leaf curl, E. WALLACE and H. H. WHETZEL (*New York Cornell Sta. Bul. 276, pp. 157–178, figs. 8*).—The origin, history, and geographical distribution of the peach leaf curl (*Exoascus deformans*) are discussed, after which an account is given of the disease occurring in New York, its economic importance and varietal susceptibility. The data regarding the susceptibility of varieties were obtained from reports from a large number of growers throughout New York, from which it appears that the variety Elberta is the most subject to the disease.

Experiments were carried on in 1908–9 for the control of this disease, in which the trees were sprayed with Bordeaux mixture and lime-sulphur compounds of various kinds. It was found that all the fungicides were efficient in the control of the disease, the time of application being the most important factor. In general it was found desirable to spray the trees before the buds had begun swelling in the spring. If the spraying is done early and with sufficient thoroughness but little loss need be experienced.

Taphrina andina n. sp., B. PALM (*Svensk Bot. Tidskr., 3 (1909), No. 2, pp. 192–195, fig. 1*).—The author describes and figures the macroscopic and microscopic characters of *T. andina* n. sp., parasitic on the leaves of *Prunus salicifolia* from Ecuador.

The American gooseberry mildew, STEFFEN (*Prakt. Rathgeber Obst u. Gartenbau, 1909, p. 257; abs. in Ztschr. Landw. Versuchsw. Österr., 13 (1910). No. 1, p. 58*).—The author claims that this disease is not very dangerous, as it has been repeatedly held in check by proper methods of control. These consist in gathering the berries as green as possible, especially if the mildew was present during the preceding year, cutting and burning all affected canes, spraying every 10 to 12 days with 700 gm. of potassium sulphid to 100 liters of water, and just before the leaves appear spraying with a mixture of Bordeaux mixture and potassium sulphid in the proportion of 100 liters of Bordeaux to 300 gm. of potassium sulphid.

The spread of the American gooseberry mildew by means of packing material, N. VAN POETEREN (*Tijdschr. Plantenziekten, 16 (1910), No. 1–2, pp. 46–58*).—It is claimed that the spores of this mildew may be transported from place to place in the packing material used around plants, which are being shipped, and that the crates, boxes, etc., in which the fruit is shipped may also prove a source of danger.

The important diseases of the grape, J. RITZEMA BOS (*Tijdschr. Plantenziekten, 15 (1909), No. 3–5, pp. 95–99, figs. 8*).—The author figures and describes the macroscopic characters of the following diseases of grapes: White rot (*Coniothyrium diplodiella*), brown rot (*Botrytis cinerea* or *Monilia*), powdery mildew (*Oidium tuckeri*), downy mildew (*Peronospora viticola*), Botrytis rot of the unripe berries, anthracnose (*Glœosporium ampelophagum*), and black rot (*Læstadia bidwellii*).

The grape anthracnose in the Netherlands, J. RITZEMA BOS (*Tijdschr. Plantenziekten, 15 (1909), No. 3–5, pp. 85–94, fig. 2*).—This is a popular description of the common grape anthracnose (*Glœosporium ampelophagum*), together with directions for its control.

A disease of the cacao plant, C. K. BANCROFT (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1910, No. 3, pp. 93–95*).—A discussion is given of *Diplodia cacaoicola*, the fungus causing die back of the stems and brown pod of the fruits of the cacao. In the absence of a complete life history of the fungus it is said to be impossible to suggest definite remedies for combating this disease, but careful cultivation, manuring, and pruning so as to produce a vigorous growth of the trees, and cutting out diseased branches and pods and covering the wounds with coal tar or a mixture of coal tar and clay, together with the removal and burning or burying with lime of all diseased material, are means recommended for keeping the disease under control.

The Taphrina species of the birch, O. JUEL (*Svensk Bot. Tidskr., 3 (1909), No. 2, pp. 183–191, pls. 3, fig. 1; abs. in Centbl. Bakt.* [etc.], *2. Abt., 26 (1910), No. 16–17, p. 482*).—The author figures and describes 11 species of Taphrina parasitic on various species of birch.

The Oïdium of the oak in the Botanical Garden of Naples, G. TRINCHIERI (*Bul. Orto Bot. R. Univ. Napoli, 2 (1909), No. 3, pp. 455–459*).—Attention is called to the occurrence of this mildew in Italy on two species of oaks, *Quercus brutia* and *Q. thomasii*, in addition to the hosts previously reported.

Three species of the type of Æcidium cornutum, F. D. KERN (*Abs. in Science, n. ser., 31 (1910), No. 799, p. 638*).—Attention is called to the confusion that has existed in the species of *Æ. cornutum*. As a result of studies on the biology and morphology of the fungus three species have been determined. The original *Æ. cornutum* is found to occur only on species of Sorbus, the second species on Aronia in Europe and America, and the third species, which is known only in America, occurs on various species of Amelanchier.

A disease of Pterocarpus indicus (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1910, No. 3, pp. 95, 96*).—This tree, which is extensively used as a street tree in the Straits Settlements, is said to be attacked by fungi, and in several instances a large number of trees have been killed outright. The disease is apparently confined to this species of tree, and is propagated both by the dissemination of the spores and by underground contact.

A study of the fungi has shown the presence of *Polystictus occidentalis*, *P. floridanus*, and *Schizophyllum commune*. Of these only *P. occidentalis* is considered parasitic.

No definite means are known for the control of this disease. It is suggested that trenching about the trees might check the spread of the fungus.

The Lenzites rot of coniferous woods, R. FALCK (*Die Lenzites-Fäule des Coniferenholzes. Jena, 1909, pp. XXXII+234, pls. 9, figs. 24, dgms. 2*).—This is the third number of Hausschwammforschungen, edited by A. Möller, and is an extended monograph on the growth and development of species of Lenzites that produce a dry rot in various kinds of coniferous timber. It includes also a discussion of the morphology and physiology of the fructification bodies of various species of Lenzites, their primary, secondary, and tertiary mycelial systems, microscopic and macroscopic destructive action on the wood, infection and occupation of timber, prevention and control, and diagnostic characters for judging the Lenzites rot and its distribution in forests and in buildings.

A species of Nectria fruiting upon the earth, J. B. POLLOCK (*Abs. in Science, n. ser., 31 (1910), No. 799, pp. 638, 639*).—In connection with studies of a Fusarium disease of white pine seedlings the author noted what is probably the perfect form of this species. This is believed to be *F. pini*, but this has not been definitely proved.

Pine seeds were planted in pots and the soil inoculated from an infested seed bed. Shortly after the seedlings came up they were attacked by a Fusarium, probably *F. pini*, and the seedlings that survived the attack were allowed to

stand for more than two months in the greenhouse. At the end of that period small inconspicuous reddish bodies, the perithecia of the Nectria, were observed scattered over the surface of the soil in the pots. None of them grew on the dead seedlings but directly on the soil. The experiments were repeated and the perithecia appeared again in a little more than two months. Attempts to grow the ascospores were unsuccessful, chiefly because of the great number of bacteria which developed.

At the present time the connection between the Nectria and Fusarium is not absolutely established, but the author believes it very probable.

Fomes annosus and two species of Gymnosporangium on Juniperus virginiana, C. HARTLEY (*Abs. in Science, n. ser., 31 (1910), No. 799, p. 639*).—The presence of *F. annosus* on the roots of *Pinus strobus* and *P. rigida* is reported, and it is said also to cause the death of *J. virginiana* and probably to occur on *P. tæda* in Delaware.

The author also notes the occurrence of *G. germinale* and an undescribed species of the same genus on red cedars in Virginia, Maryland, and Connecticut.

Notes on some diseases of coniferous nursery stock, C. HARTLEY (*Abs. in Science, n. ser., 31 (1910), No. 799, p. 639*).—Brief notes are given on the occurrence of *Rhizoctonia* sp., *Pythium debaryanum*, and a parasitic leaf blight occurring on seedlings in a coniferous nursery in Nebraska.

Some new parasitic fungi of ornamental plants, II, G. TRINCHIERI (*Rend. Accad. Sci. Fis. e Mat. Napoli, 1909, No. 8–12, p. 9; abs. in Riv. Patol. Veg., 4 (1910), No. 7, p. 101*).—The author calls attention to the occurrence of *Phomopsis alocaperceraseæ* and *Pestalozzia aloea* on scapes and flowers of the aloe, and of *Glœosporium polymorphum* and *Colletotrichum dracænæ* on the leaves of *Dracæna fragrans*.

Experiments on the infection of Lychnis (Melandrium) album by Ustilago violacea, E. WERTH (*Mitt. K. Biol. Anst. Land u. Forstw., 1909, No. 8, pp. 13–15*).—The author claims to have produced flower infection of this smut by placing spores and pollen grains on the stigmas of healthy flowers. The spores form sporidia, which on germination produce hyphæ that penetrate the ovary of the flower and subsequently other pistillate flowers. The presence of this mycelium in the plant causes the dormant stamens to develop and a hermaphrodite flower is produced, the stamens of which are full of smut spores in place of pollen grains and the pistil of which is sterile. The original flower, the stigma of which was directly inoculated with pollen and smut spores, showed in almost every instance no evidence of such infection, but produced sound and healthy seed. All subsequent flowers were sterile.

According to the author, the spores of this smut have a twofold function—one, like the uredospores of rusts, to disseminate the smut during the summer by flower infection, and the other, like the teleutospores, to enable the smut to winter over and produce new infections on the seedlings and young shoots in the spring.

The principal diseases of the rose, L. MONTEMARTINI (*Riv. Patol. Veg., 4 (1910), No. 8, pp. 126–128*).—This is a popular description of the following pests of roses, together with recommendations for their control: Rust (*Phragmidium subcorticium*), leaf spot (*Marsonia rosæ*), mildew (Oidium), green lice (aphids), rose sawfly (*Hylotoma rosæ*), and gall flies (*Rhodites rosæ*).

The preparation of Bordeaux mixture, H. M. QUANJER (*Tijdschr. Plantenziekten, 16 (1910), No. 1–2, pp. 16–31, pl. 1*).—After a series of experiments on different methods of making this spray, the author recommends 1½ kg. copper sulphate and ¾ kg. lime to 100 liters of water. The copper sulphate is dissolved in a wooden vat by suspending it in a sack in 50 liters of water, or it can

be more readily dissolved in 8 liters of boiling water and then 42 liters of water added. The lime is slaked in a bucket and strained through a sieve into a vat capable of holding 100 liters. The slaking is continued until all the lime is used, ½ oz. sugar added to the lime and water up to 50 liters, and the copper sulphate solution (which in the meantime must be entirely cold) poured in, stirring rapidly and thoroughly. If, on testing with a clean knife blade, a copper deposit is formed, more lime must be added until there is no tarnishing of the blade. The spray is then ready for use.

Powder for Bordeaux mixture, K. H. M. van der Zande and G. H. G. Lagers (*Tijdschr. Plantenziekten, 16 (1910), No. 1–2, pp. 32–41, pls. 2*).—The results are given of experiments with various proportions of copper sulphate and soda in the preparation of a powder which when mixed with water will make an efficient spray similar to Bordeaux mixture as usually prepared.

It is claimed that when the powder is made from small crystals of copper sulphate, in place of coarse crystals, it keeps longer and chemical changes occur less readily before using it. It was also found that 60 parts by weight of copper sulphate and 40 parts of soda, or 65 parts of copper sulphate and 35 parts of soda, produced as satisfactory results as the powder commonly recommended consisting of 70 parts of copper sulphate and 30 parts of soda.

Which deserves the preference, Bordeaux or Burgundy mixture? H. M. Quanjer (*Tijdschr. Plantenziekten, 16 (1910), No. 1–2, pp. 42–45*).—This is a discussion of the merits of these two fungicides, as regards cheapness, simplicity of preparation, stability, both before and after application, adhesion to plants, direct action on the plants, and protection of the plants against disease.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Life histories of northern animals, E. T. Seton (*New York, 1909, vols. 1, pp. XXX+1 673; 2, pp. XII+677 1267, pls. 100, figs. 267, maps 68; rev. in Science, n. ser., 30 (1909), No. 782, pp. 924–927*).—In the introduction a sketch is given of the physical features of Manitoba followed by a section on the faunal areas and life zones of Canada. The section treating of the geology and physical features contains a map illustrating the distribution of deciduous and coniferous forests, the sand hills, and marshes of the province. The section devoted to faunal areas is illustrated by a faunal map of North America, excluding the Tropics, the continent being divided into 3 primary regions—arctic, temperate, and tropical, and these again into smaller areas designated as faunas and subfaunas.

Volume 1 takes up the grass eaters and volume 2 the flesh eaters. The work aims to be a book of popular natural history on a strictly scientific basis. Although it has been limited to the 60 species that are found in Manitoba, these include all the large mammals of the United States, with the exception of about a dozen.

The review is by J. A. Allen.

Notes on Kansas mammals, D. E. Lantz (*Trans. Kans. Acad. Sci., 22 (1908–9), pp. 336, 337*).—Notes are given on the 7 forms of rabbits known to occur in Kansas, including 2 hitherto unreported races. A specimen of the Mexican free-tailed bat (*Nyctinomus mexicanus*) is also reported to have been collected in the State, making the total number of forms of native mammals of Kansas 88.

The muskrat, D. E. Lantz (*U. S. Dept. Agr., Farmers' Bul. 396, pp. 38, figs. 5*).—This publication discusses the habits, economic relations, and value of the muskrat, or musquash (*Fiber zibethicus*).

Five species and 8 subspecies or geographic races of muskrats have been described. These are distributed over the greater part of North America, from the southern border of the United States to the barren grounds of northwest Canada and from the Atlantic to the Pacific, but seem to be absent from the coastal parts of South Carolina, Georgia, Alabama, and Texas, as well as from Florida and nearly the whole of California.

"In winter the chief food of muskrats consists of the roots of aquatic plants—pond lilies, arums, sedges, and the like, but in some localities the animals feed on mussels and also on carp and other sluggish fish that bury themselves in mud." In summer its menu is far more extensive as it can then choose from many aquatic plants, and in addition can obtain supplies from nearby fields or woods. Its destructive habits are discussed under injury to gardens and crops, rice, water lilies, tidal meadows, dams and embankments, and to fish. While its chief value is for its fur, 5,000,000 pelts having been sold in London alone during 1905, the muskrat is also valuable for its flesh, which is utilized for food. Directions are given for its preparation and cooking for food, trapping, care of skins, and similar points. It is stated that muskrat farming is already a prosperous business in some localities. The methods of destruction and protection of property where muskrats become a pest are briefly described, and the closed seasons of 13 States which protect them are indicated.

The author concludes that although muskrats do considerable damage in some places, they are of much economic value and should be protected by proper laws. Local enactments should prohibit their destruction during the reproducing season and whenever their furs are not prime, spearing and shooting should be prohibited, muskrat houses protected at all times, and the trapping season be nearly uniform for the different States.

Text-book of protozoology, F. DOFLEIN (*Lehrbuch der Protozoenkunde: Eine Darstellung der Naturgeschichte der Protozoen mit besonderer Berucksichtigung der Parasitischen und Pathogenen Formen. Jena, 1909, pp. X+914, figs. 825; rev. in Science, n. ser., 31 (1910), No. 795, pp. 456–458; Nature [London], 83 (1910), No. 2105, pp. 1–3*).—This work consists of 2 parts.

The first is divided into 6 chapters, which are devoted to general morphology, physiology, reproduction, biology, classification, and technique, respectively, a bibliography being appended to each chapter. The second part contains a systematic presentation of the phylum by orders and families, which, with many of the important parasitic and pathogenic forms, are carried to genera and species. The pages devoted to the spirochetes and the classes Mastigophora, Rhizopoda, Sporozoa, Ciliata, and Suctoria include full bibliographical lists. Special chapters on the parasitism and pathological significance of the different groups are interspersed in this part.

Author and subject indexes are included in the volume.

Index-catalogue of medical and veterinary zoology, C. W. STILES and A. HASSALL (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 39, pts. 26, pp. 1981–2076; 27, pp. 2077–2168*).—Part 26 includes titles arranged by authors alphabetically from S to Schnyder, and Part 27 those from Schoch to Silvestrini.

Indian insect life, H. M. LEFROY and F. M. HOWLETT (*Calcutta and London, 1909, pp. XII+786, pls. 85, figs. 536*).—This manual of the insects of tropical India, based upon the Pusa collection, was prepared to fill a much required need. It is richly illustrated by text figures and plates. The greater number of the plates are colored, many being prepared under the junior author's direction by the artist staff of the Agricultural Research Institute, which is wholly composed of natives of India, trained in the art schools of that country.

In the introduction the author considers the zoological position, instinct and habit, classification, number of species, nomenclature, identification, entomology

in India, zoo-geographical divisions, food and habitat, and insects and man. The more important orders are then taken up as follows: Aptera (pp. 43–46), Orthoptera (pp. 47–107), Neuroptera (pp. 108–160), Hymenoptera (pp. 161–233), Coleoptera (pp. 234–396), Lepidoptera (pp. 397–542), Thysanoptera (pp. 542–544), Diptera (pp. 545–664), and Rhynchota (pp. 665–764).

A frontispiece map is given indicating the faunal zones and probable subregion of tropical India.

Insect types and cotypes, C. H. Withington (*Trans. Kans. Acad. Sci., 22* (*1908–9*), *pp. 327–335*).—This is a preliminary list of 872 type species in the Francis Huntington Snow entomological collections at the University of Kansas.

Additional results of collecting insects in Kansas and Colorado, E. S. Tucker (*Trans. Kans. Acad. Sci., 22* (*1908–9*), *pp. 276–304*).—Lists of hymenoptera and diptera are presented.

The relation of temperature to the growth of insects, E. D. Sanderson (*New Hampshire Sta. Sci. Contrib. 4, pp. 113–140, charts 21; Jour. Econ. Ent., 3* (*1910*), *No. 2, pp. 113–140, charts 21*).—In this paper the author reviews the literature relating to the effect of temperature on the development of insects and reports the results of experiments in which either the egg or pupa or both, of several species, were studied. He again calls attention to the fact previously noted (E. S. R., 20, p. 252) that the point above which temperatures are effective varies with the species and is not constant at 43° F. Thus Toxoptera and Lysiphlebus may develop at 1.65° C., while Margaropus and others will not develop under 5 to 10° C.

In studying the relation of temperature to insect growth, different stages of several insects were reared at fairly constant temperatures. Ordinary bacteriological incubators were used for temperatures of 80 and 90° F. An uniced refrigerator maintained a fairly constant temperature of about 65° in winter and 70° in summer. A constant temperature apparatus in which the cold from an ice chamber was balanced by the heat from a gas jet and controlled by an electric thermostat gave close to 60° and an ordinary refrigerator was iced to maintain approximately 50°. The results of the investigation, together with data relating to a number of additional species reported by various workers, are summarized in the form of charts. The following table of the species studied by the author has been compiled from the charts presented:

Average period of development of insects at constant temperatures.

Species.	Stage.	Temperature (Centigrade).									
		10°	12°	16°	18.5°	20°	21°	26°	27°	28°	32°
		Days.	*Days.*	*Days.*	*Days.*	*Days.*	*Days.*	*Days.*	*Days.*	*Days.*	*Days.*
Melacosoma americana	Pupa	Dead.	Dead.	54	......	22.5	......	......	18	......	10
Euproctis chrysorrhœa	Egg	(a)	(a)	30	......	......	21	......	15	......	(a)
Samia cecropia	...do	(a)	(a)	25	......	14.5	......	9	......	......	9
Tenebrio molitor	...do	(a)	55	......	......	18	......	......	......	7	6
Do	Pupa	(a)	51	34	......	16	......	......	......	......	5.5
Leptinotarsa decemlineata	Egg	......	......	......	7	......	......	4	......	......	3

[a] Failed to hatch.

A list of 26 titles referred to is appended.

Superparasitism: An important factor in the natural control of insects, W. F. Fiske (*Jour. Econ. Ent., 3* (*1910*), *No. 1, pp. 88–97, fig. 1*).—Superparasitism, a new term introduced by the author, results when any individual host

is attacked by two or more species of primary parasites or by one species more than once. "It differs materially from secondary parasitism, or hyperparasitism as it is variously called, although both are, strictly speaking, double parasitism of an individual. In superparasitism the parent females are both attracted to the primary host primarily for its own sake. In hyperparasitism one of them is attracted to the primary host secondarily and incidentally, and for the sake of the primary parasite which it harbors."

The author considers superparasitism the equal of hyperparasitism in its effect upon the natural control of parasitic insects and thinks it should be given equal attention.

Proceedings of the twenty-second annual meeting of the American Association of Economic Entomologists (*Jour. Econ. Ent., 3 (1910), No. 1, pp. 1-64, pls. 5, fig. 1*).—The business proceedings of the association, reported in part 1 (pp. 1-11), include a list of the common names of 52 insects, that were adopted.

The address of the president, W. E. Britton, was entitled The Official Entomologist and the Farmer (pp. 12-20). E. P. Felt discussed Observations on the House-fly (pp. 24-26). An experiment conducted led to the conclusion that the house or typhoid fly does not breed freely in darkness. Through the use of cement underpinning, it is comparatively easy to construct dark cellars where manure and other fly breeding material can be kept without producing swarms of flies. These measures, while particularly adapted to the farm, will also prove of service in villages and cities. Controlling the Black Fly in the White Mountains was the subject of a discussion, by E. D. Sanderson (pp. 27-29), who concludes that the destruction of these flies in mountain resort regions is as feasible as the control of mosquitoes in low countries such as the vicinity of New York and New Jersey.

Under the subject of New Sprays for the Codling Moth, C. P. Gillette (pp. 29-35) discussed experiments made with sulphid of arsenic (AS_2 S_3), lime, black leaf extract, and sulphate of nicotine. In the attempt to find some insecticide that would be effective and less injurious to the trees in Colorado than are the arsenicals now in use, experiments were conducted at Delta which indicate that sulphid of arsenic may be as efficient as arsenate of lead. "Good lump lime, 50 lbs. to 100 gals. of water, seemed to give no protection at all, as the percentage of perfect fruit on these trees averaged 58.9, exactly as in case of the check trees. Black leaf extract was used in the proportion of 1 gal. diluted to 50 gals. with water. The trees sprayed with this mixture gave fruit that was 77 per cent free from worm injuries, or about 18 per cent more perfect fruit than in the check block. Sulphate of nicotine was used in the proportion of 1 part in 750 parts of water and seemed to give slight protection, as the trees sprayed with this mixture bore fruit that was 73 per cent free from all worm injuries, an improvement of practically 14 per cent over the fruit of unsprayed trees. Even this application indicates a protection of almost exactly 33 per cent of the fruit that would have been wormy if untreated, for the check trees had but 41.1 per cent of their fruit injured by worms."

Arsenical Poisoning of Fruit Trees was briefly considered by W. P. Headden (pp. 32-35), and Present Conditions of the Gipsy and Brown-tail Moth Work in Massachusetts, by F. W. Rane, (pp. 36-38). Some Insecticide Methods used in Combating the Gipsy Moth were described by A. F. Burgess (pp. 38-42).

W. E. Hinds and W. F. Turner presented a paper on Carbon Disulphid Fumigation for the Rice Weevil in Corn (pp. 47-56). This pest is thought to be at the present time the most injurious species of insect occurring in Alabama. Numerous germination tests show that weevil injury is in all probability responsible to a considerable extent for irregular stand and lack of uniformly

normal growth in the cornfields of the badly infested area. While a considerable injury is inflicted by grain moths, both before and after the corn is harvested. the principal injury after harvesting is attributable to various species of Coleoptera, among which six have been particularly abundant.

It was found that any treatment which insured the destruction of all emerged adults of the rice weevil was very likely also to destroy the unemerged stages, with the possible exception of the egg. The percentage of moisture content in seeds is important as affecting their degree of resistance to the carbon disulphid and it appears that the temperature prevailing at the time treatment is made has much to do with the effectiveness of a given dosage. The imporant results obtained from the experiments are summarized as follows: "Grain infesting insects may be destroyed with carbon disulphid, cheaply and effectively, by even an application of 5 lbs. per 1,000 cu. ft. in exceptionally tight compartments, while the temperature is above 70° F. It requires but a few hours to kill the weevils if a strength of gas equal to one-quarter of a saturated atmosphere can be maintained, and provided the temperature is high enough to insure a considerable degree of vital activity on the part of the insects. Fumigation work with temperatures ranging below 60° appears to be largely ineffective and inadvisable. It is estimated that at most the expense of treatment will average less than a cent per bushel."

In discussing Notes on Spraying Experiments for the Oyster Shell Scale in Montana, R. A. Cooley reported (pp. 57–64) tests made of various insecticides applied at 3 different periods of development namely (1) Before hatching and before the buds had opened; (2) early in the hatching period, and (3) late in the hatching period. He concludes that the eggs are unaffected by the application of lime-sulphur solutions previous to the opening of the buds. "On trees so sprayed the young were killed very soon after hatching. The intervention of rain storms before the hatching of the eggs may more or less affect the value of the treatment. It is indicated that emulsions of linseed oil and cotton-seed oil may be useful for the treatment of this insect while in the egg stage and during the hatching period."

Proceedings of the eighth annual meeting of horticultural inspectors (*Jour. Econ. Ent., 3 (1910), No. 1, pp. 65–84*).—In opening the eighth meeting at Boston, 1910, F. L. Washburn discussed (pp. 69–71) the work of the association.

Brown-tail Moth on Imported Nursery Stock was the subject of a paper by G. G. Atwood, of New York (pp. 71–76), in which the inspection work as carried on in that State was discussed. Large numbers of winter nests of brown-tail moths were found during the spring of 1909 in importations of nursery stock from France. Out of 860 shipments with a total of 4,566 packages of various sorts inspected, 707 boxes and 2 bales were burned, and 7,000 nests destroyed. An infestation of nursery stock on a large private estate in Westchester County, brought about through shipment of cratægus late in the fall of 1908 from an eastern State, was stamped out.

European Conditions as Affecting Imported Nursery Stock were described by L. O. Howard (pp. 76, 77). He announced that a governmental inspection service would be established in France under the direction of Dr. Paul Marchal, which will enable the issuing of such certificates as will guarantee freedom from insect pests.

A paper on Increasing the Demand for Orchard Inspection was presented by N. E. Shaw, of Ohio (pp. 77–80), and Notes on the State Nursery Laws of Oklahoma and Their Effect, by C. E. Sanborn (pp. 82–84).

Ninth report of the state entomologist, 1909, W. E. Britton (*Connecticut State Sta. Rpt. 1909–10, pt. 4, pp. VI+323–374, pls. 16, figs. 9*).—The inspection

of nurseries and of imported nursery stock is first briefly reported upon. During the year 224 boxes and packages imported from France were inspected. One lot of 13 boxes was found to be infested with 52 winter nests of the browntail moth, a few on pear and quince, but mostly on apple and dwarf apple stock. A bill providing for the inspection of apiaries to suppress contagious diseases of bees, which was passed in 1909, is briefly discussed, as is the municipal spraying of elm trees in Connecticut during 1909, and the work against the gipsy moth. During the winter of 1908–9 but 6 egg masses of the gipsy moth were destroyed at Stonington and but 98 caterpillars during the summer of 1909. In December, 1909, a colony of gipsy moths was discovered at Wallingford, of which up to March 1, 1910, 7,500 egg clusters had been destroyed.

Summarized accounts of the rosy apple aphis (*Aphis sorbi*), bud moth, leopard moth, and peach borer, including references to the literature, are presented. During 1909 the rosy apple aphis was a source of considerable injury to apple trees. Its eggs hatch about the middle of April just as the green leaves begin to show at the ends of the buds. In 1909 they were abundant through blossoming time and were thick on the young fruit. During the latter part of June or about July 1 they disappeared entirely from the trees and did not return again until October. On November 12, 1909, the aphids were laying eggs, though but few could be found. Efforts were made during the summer to discover its intermediate host plant, but without success. Technical descriptions of its several stages, prepared by A. I. Bourne, accompany the account. *Megorismus fletcheri* was its most important parasite in Connecticut. During the past two or three seasons the bud moth seriously injured apple trees in certain portions of the State, particularly at Stonington. Observations made following the use of arsenate of lead (1 lb. to 10 gal. of water) at that place for the gipsy moth indicate that this poison will also control the bud moth. Considerable evidence of serious damage by the leopard moth to shade trees, particularly elms, came to the author's attention. Next to the San José scale, the peach borer is thought to be the most serious insect enemy of the peach in Connecticut. Brief mention is made of mosquito breeding areas examined at the request of health officers. B. H. Walden reports upon the fumigation of several buildings with hydrocyanic-acid gas.

Under the heading of miscellaneous insect notes, mention is made of the tobacco bud worm (*Chloridea virescens*) which was found feeding upon experimental tobacco plants growing on the station grounds; of cankerworms which were the source of much damage locally to orchard and shade trees throughout the State; of the greenhouse leaf tyer (*Phlyctænia ferrugalis*) which injured greenhouse cinerarias and daisies at New Haven by devouring the leaves; of the strawberry crown girdler (*Otiorhynchus ovatus*) which destroyed young hemlock trees in a New Haven nursery; of white grubs in grass lands; of white ants (*Termes flavipes*) which injured a dwelling house in South Norwalk; and of the green rose chafer (*Euphoria* [*Cetonia*] *aurata*) which was found in the packing from nursery stock imported from Europe.

Injurious insects and remedies, C. J. S. BETHUNE (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35* (*1909*), *pp. 27–34*).—During the year aphids attacked nearly every cultivated plant and many fruit and shade trees. The European elm scale was very abundant in the northern part of the city of Toronto and the cottony maple-scale also appeared in certain sections of that city. Other insects the occurrence of which is noted are the boll or corn ear worm and the carrot rust fly (*Psila rosæ*).

Experiments were conducted by T. D. Jarvis in which Vanco brand arsenate of lead, 2 lbs. to 40 gal. of water, was applied at a pressure of 200 lbs. in a 6-acre orchard of Greenings and a 10-acre orchard of Baldwins. The first

application commenced on June 4, at a time when the young fruit was just forming and the inner calyx cup easily reached. The Bordeaux nozzle was used in the application. A second application was made in the 6-acre orchard about June 25, a Friend nozzle being used. The 6-acre orchard produced fruit about 99 per cent free from worms, the 10-acre orchard fruit about 70 per cent free and 2 acres unsprayed about 20 per cent free.

Experiments conducted show that either 3 lbs. arsenate of lead to 40 gal. of water or ½ lb. of Paris green to a like quantity of water is sufficiently strong to kill the larvæ of the potato beetle and that any larger quantity used is only wasted. Good results were obtained in the eradication of croton bugs (*Ectobia germaica*), which infested certain parts of the college residence, from the use of a commercial product containing a considerable amount of phosphorus. The home-boiled lime-sulphur wash gave good results against the pear-leaf blister mite on apples.

Spraying experiments for the codling moth were conducted by L. Caesar in an orchard of 25 acres at Stoney Creek. The first spraying was begun June 5, at which date nearly all the blossoms were off the Astrachan trees and other early varieties and most of them were ready to fall from the later varieties. For this spray arsenate of lead alone, 2 lbs. to 40 gal. of water, was applied at a pressure of 140 lbs. About 3 weeks after the first application was commenced a second was made, consisting of self-boiled sulphur, made up of 10 lbs. lime and 10 lbs. sulphur, boiling water being used to slack the lime and the mixture then being diluted with 40 gal. of water, 2 lbs. of arsenate of lead added, and applied with a Friend nozzle at a pressure of 160 lbs. In the lower half of the orchard 96 per cent of the picked apples were free from worms, and 88 per cent in the upper half.

Observations indicate that home-boiled lime-sulphur wash (20-15-40) applied to the trees shortly before the leaf buds burst is the most satisfactory treatment for the oyster shell scale. Experiments with caustic soda (Gillett's lye) show that in order to be of value against the scale it has to be very strong. Thirteen cans, which contained approximately 10 lbs. of caustic soda, to 40 gal. of water, was found to be necessary to give fairly good results.

[Report of the entomologist of Mozambique], C. W. Howard (*Mozambique Dept. Agr. Bul. 1, pp. 15-23*).—This is a preliminary report of observations made of the various insect problems in Portuguese East Africa.

Among the enemies of citrus fruits mentioned are the orange-tree butterfly caterpillar (*Papilio demoleus*), California red scale (*Chrysomphalus aurantii*), Florida red scale (*C. aonidum*), purple scale, soft scale, orange mealy-bug, citrus psylla (*Psylla* sp.) citrus aphis (*Siphonophora citrifolii*), cottony cushion scale, and orange codling moth (*Enarmonia batrachopa*). The greedy scale occurs on apples, pears, and grapes, and a species of thrips damages mangoes, roses, and several ornamental shrubs. About Magude, the stock borer (*Sesamia fusca*) has been found attacking maize. The South African cotton stainer (*Dysdercus* sp.) is reported to be very common in the Province. The bagrada bug (*Bagrada hilaris*), a pest of cruciferus crops, is present in many places. The red winged locust (*Cyrtocanthacris septemfasciata*) is the migratory species occurring in Mozambique. Observations on ticks and mosquitoes and a list of the more important fungus diseases are also included in the report.

Some new species of Mallophaga from Michigan, M. A. Carriker, Jr., and C. A. Shull (*Ent. News, 21 (1910), No. 2, pp. 51-57, pl. 1*).—*Colpocephalum spinulosum obscurum* from the turnstone (*Arenaria interpres*); *C. ocularis*, also from the turnstone; *C. subpustulatum*, from *Ceryle alcyon*; *Menopon hirsutum*, from *Dryobates pubescens*; and *Nitzschia latifrons*, from *Riparia riparia* are described as new.

Blattid notes, A. H. Rosenfeld (*Jour. Econ. Ent., 3 (1910), No. 1, pp. 100, 101*).—The average number of eggs contained in the oöthecae of 10 cockroaches (*Periplaneta americana*) examined was 24, the maximum 28. This species was found to eat the eggs even when furnished with an abundant food supply. A large specimen that was placed in a breeding cage June 26, 1908, and kept constantly supplied with food in the shape of Irish potatoes, starch, etc., lived until October 30, 1909, or a period of 1⅓ years.

The San José scale and its relation to climatic districts or life zones in Wisconsin, H. H. P. Severin (*Jour. Econ. Ent., 3 (1910), No. 1, pp. 101–103, fig. 1*).—The San José scale appears to be confined to the southern part of the State, not having been found in the transition zone as limited by Merriam's earlier map. A serious infestation of red dogwood by this pest is reported to have been discovered in one locality near Madison.

A new species of Aspidiotus, G. W. Herrick (*Ent. News, 21 (1910), No. 1, pp. 22, 23, pls. 2*).—*Aspidiotus mori*, collected near College Station, Tex., from branches of the native red mulberry tree (*Morus rubra*), is described as new.

Coccidæ of Kansas, G. A. Dean (*Trans. Kans. Acad. Sci., 22 (1908–9), pp. 265–275*). A short bibliography of the Kansas coccidæ, with the locality and plants upon which they were taken.

The army cutworm, R. A. Cooley (*Montana Sta. Circ. 4, pp. 35–44, figs. 2*).—This circular describes the army cutworm that occurs in Montana, its life history, habits, injury and remedial measures. As previously noted (E. S. R., 20, p. 351) there appear to be two or three forms of a single species that are the source of injury.

The life history of an oriental species of Cochlidiidæ introduced into Massachusetts (Cnidocampa flavescens), H. G. Dyar (*Proc. Ent. Soc. Wash., 11 (1909), No. 4, pp. 162–170, pl. 1*).—The special structural characters, affinities, habits, etc., and descriptions of the several stages of the oriental moth are given with a synonymic bibliography. See also a previous note (E. S. R., 18, p. 951).

A new species of Acrobasis, H. G. Dyar (*Proc. Ent. Soc. Wash., 11 (1909), No. 4, p. 214*). *Acrobasis feltella*, bred from larvæ found boring in the petioles of hickory, at Warner, N. Y., is described as new.

New Microlepidoptera from New Mexico and California and a synoptic table of the North American species of Heliodines, A. Busck (*Proc. Ent. Soc. Wash., 11 (1909), No. 4, pp. 175–188*).—In addition to the numerous new species here described a table is given for the separation of North American species of Heliodines.

A new tortricid of economic importance in the Hawaiian Islands, A. Busck (*Proc. Ent. Soc. Wash., 11 (1909), No. 4, pp. 201, 202*).—The species here described, *Amorbia emigratella*, is quite a pest in the Hawaiian Islands. The larvæ are leaf-rollers on many kinds of plants, shrubs, and fruit-trees, often being so numerous as to defoliate the trees and sometimes attack the fruit as well. The species has long been known to the author from Mexico, who thinks it was introduced into Hawaii from that country within comparatively recent years.

Notes on Chambers' species of Tineina, Annette F. Braun (*Ent. News, 20 (1909), No. 10, pp. 428–434, figs. 4*).—Notes on the host plants and habits of a number of species are included in this account.

Description of a new species of Coriscium, C. R. Ely (*Ent. News, 21 (1910), No. 2, pp. 57, 58*).—A tineid, *Coriscium serotinella*, bred from larvæ from the tips of leaves of *Prunus serotina* in August, 1909, at East River, Conn., is described as new.

Papers on cereal and forage insects—The sorghum midge, W. H. Dean (*U. S. Dept. Agr., Bur. Ent. Bul. 85, pt. 4, pp. 39–58, pls. 2, figs. 12*).—The sorghum midge (*Contarinia* [*Diplosis*] *sorghicola*) is said to be the most destructive of the insect and other pests which injure sorghum seed. The first report of injury by this pest, made by D. W. Coquillett in 1895, was based upon sweet sorghum material received from Dillburg, and Montgomery, Ala. Since 1898 when the species was described by Coquillett as new to science, several accounts of its injury have been published. Investigations were commenced by the author on July 25, 1908, at Baton Rouge, La., and continued during 1909 at San Antonio, Tex. He reports that in addition to the many varieties of sweet sorghum, this pest infests broom corn, kafir corn, Johnson grass, and milo maize and that specimens have been reared from the common foxtail grass (*Setaria glauca*) and *Sieglingia seslerioides*.

Technical descriptions of the several stages of the midge are followed by a discussion of its life history and habits. The place of deposition of the egg varies, being dependent upon the stage of seed development. Upon hatching, the larvæ immediately make their way to the ovary and are invariably found lying directly against it. A faint discoloration of the ovary takes place at the point of contact with the larva shortly after the latter has taken its normal position. The pupa is formed in exactly the same position as has been occupied by the larva during its growth and development. There are no well-defined broods or generations, the midge being found from early spring until late fall in any stage from egg to adult. At Baton Rouge, with an average daily mean temperature of 79° F. and an average daily mean humidity of 74.3, the life cycle from oviposition to emergence of adults was found to be 23½ days, while at San Antonio with an average daily mean temperature of 84.7° and a humidity of 67.5, 14 days were required for their development. "In the latitude of San Antonio, Tex., generally speaking, the egg stage will cover from 2 to 4 days, the larval stage from 9 to 11 days, and the pupal stage from 3 to 5 days, depending upon the temperature and humidity. . . . Females were found upon dissection to contain from a dozen to upward of a hundred eggs." At San Antonio in 1909 the first midges were observed on May 14, at which time they were actively ovipositing in Johnson grass. "At this date the neighboring sorghum had not headed, and it was not until June 10 that the first brood emerged from the sorghum, which puts the date of this first infestation at approximately June 5." The cocooned larva is reported to be the true hibernating form but normal pupæ will stand considerable cold and later upon being exposed to sufficiently high temperature will emerge.

In certain localities the midge is highly parasitized by *Aprostocetus diplosidis* and *Tetrastichus* sp., but these species do not become sufficiently numerous to check the midge materially until late in the summer when the second and third crops of sorghum are heading. These crops are found to mature upward of 90 per cent of sound seed, while the earlier crops are a total failure. During the latter part of the summer these parasites often outnumber the emerging midges 5 to 6. The Argentine ant (*Iridomyrmex humilis*) is the most important of the predaceous enemies. A dolichopodid fly (*Psilopodinus flaviceps*) was observed to prey upon the adults and a humming bird is also thought to do so.

The destruction of Johnson grass is said to be one of the most vital factors in midge control. If this grass is allowed to remain over winter in and about sorghum fields, it carries the midge until spring, and being the first to head and bloom, gives the midge a good start, so that by the time the sorghum is headed there is a large brood of midges from the grass ready to infest it. Sorghum stalks if allowed to stand in the harvested fields will continue to send out until late in the winter branching heads which furnish breeding possibilities and

later hiberating material. When the crop is harvested all loose heads should be collected and burned and the stubble burned over. As the early crop of seed is practically destroyed by the midge and the second crop matures a very large percentage of sound seed, it is thought possible that the practice of destroying the first crop of seed and retaining the last crop will yield better results and at the same time eliminate a large percentage of midges. When a small crop of seed is desired for planting purposes it will be found practical to protect the seed heads from the midge by bagging before the heads have broken through the protecting sheath.

Two new Cecidomyiidæ, E. P. FELT (*Ent. News, 21 (1910), No. 1, pp. 10–12*).—*Lasioptera tripsaci*, reared at Plano, Tex., from larvæ occurring between the leaf blades of gama or sesame grass (*Tripsacum dactyloides*), and *Cecidomyia opuntiæ* reared from *Opuntia banburyana* received from the New York Bontanical Gardens, are described as new to science.

The carnivorous larvæ of two species of mosquito, E. GENDRE (*Bul. Soc. Path. Exot., 2 (1909), No. 3, pp. 147–150; abs. in Bul. Inst. Pasteur, 7 (1909), No. 12, p. 544*).—The larvæ of *Culex tigripes* and of an undetermined species of Megarhinus are reported to feed exclusively on the larvæ of other mosquitoes. Four or five Stegomyia larvæ are consumed daily by *C. tigripes* and seven to ten larvæ by the Megarhinus species.

Mermis larvæ, parasitic in the larvæ of Stegomyia fasciata, E. GENDRE (*Bul. Soc. Path. Exot., 2 (1909), No. 2, pp. 106–108; abs. in Bul. Inst. Pasteur, 7 (1909), No. 12, p. 544*).—In two localities at Labé, French Guiana, nematodes (Mermis) were found in nearly all of the larvæ of *S. fasciata*.

Three new Trypetidæ from the Pacific Islands, D. W. COQUILLETT (*Ent. News, 21 (1910), No. 1, pp. 12, 13*).—Three species of Dacus from Polynesia, two bred from guavas and one from oranges, are described as new to science.

Viviparity in Phorocera serriventris and other flies, W. WESCHÉ (*Jour. Quekett Micros. Club, 1909, pp. 451–458, pl. 1; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 2, p. 165*).—The author finds that by means of a microscope it is possible to detect the viviparous condition of flies, if the specimens are properly cleaned and prepared, as the hard chitinous jaws of the larvæ are not dissolved by potash and are seen through the cleared plates. In addition to this tachinid (*P. serriventris*) several other species have been found to be viviparous, namely *Olivieria lateralis*, *Plagia trepida*, *Phora ruficornis*, *Myiobia fenestrata*, *Siphona geniculata*, and *Blepharidea vulgaris*.

Amara avida as a strawberry pest, J. B. SMITH (*Jour. Econ. Ent., 3 (1910), No. 1, pp. 97–101, pl. 1, fig. 1*).—Because of cultural conditions which brought about the removal of its normal insect food, this carabid beetle attacked the berries and was the source of considerable injury to the strawberry crop in Cumberland County, New Jersey.

Additions to the list of Kansas coleoptera for 1908, W. KNAUS (*Trans. Kans. Acad. Sci., 22 (1908–9), pp. 351, 352*).—Thirty-eight additional forms are added to list of species found in Kansas.

Bees, E. F. PHILLIPS (*U. S. Dept. Agr., Farmers' Bul. 397, pp. 44, figs. 21*).—This brief summarized account aims to furnish such information as is needed by persons engaged in keeping bees and supersedes Farmers' Bulletin 59, previously noted (E. S. R., 9, p. 770).

The anatomy of the honey bee, R. E. SNODGRASS (*U. S. Dept. Agr., Bur. Ent. Bul. 18, tech. ser., pp. 162, figs. 57*).—This detailed study of the anatomy includes a discussion of the physiology of the honey bee. It is richly illustrated by original drawings and a bibliography of the more important literature is appended.

Animal parasites as the cause of disease in the honey bee, E. Zander (*Leipzig. Bienen Ztg., 24 (1909), Nos. 10, pp. 147–151, figs. 2; 11, pp. 164–166*).—The author has found that malignant dysentery, a disease of bees which occurs in Europe, is produced by a protozoan parasite closely related to *Nosema bombycis*, the cause of pebrine in silkworms. This parasite, described as *N. apis* and first discovered by the author in 1907 in the intestines of bees suffering from dysentery, is said to be responsible for an annual loss in Europe of many thousand swarms.

Unlike *N. bombycis*, which develops in all parts of the body of the silkworm, this species thrives only in the chyle stomach of the honey bee. When the resting stage of the spore enters the chyle stomach of a healthy bee, the membrane splits open and a minute ovoid parasite emerges, which immediately bores into the intestinal walls and rapidly increases, new spores being produced in a period of 4 days. The spores cause a marked discoloration of the intestines, the reddish and translucent color of healthy bees becoming dull and milky-white. The intestinal cells infested gradually die off and are excreted, thus giving rise to the possibility of infection if healthy bees come in contact with the excreta. As combs contaminated by excreta from infected bees are the main causes of the spread of the disease, it is recommended that the infected swarms be transferred to clean hives and started on artificial combs.

Bee mortality in the Stawell district (*Jour. Dept. Agr. Victoria, 8 (1910), No. 1, pp. 58–64, figs. 2*).—In this paper C. A. E. Price reports upon an examination of bees for bacterial disease (pp. 58–61), during the course of which cells which appeared to be *Nosema apis* were found in the chyle stomach of sickly bees. In but a single instance was the parasite discovered in bees supposed to be normal.

R. Beuhne discusses (pp. 62–65) the disease due to *N. apis* as noted above, which is thought to be the cause of the loss in Victoria. "Experiments carried out with the object of infecting healthy bees by feeding them with honey which had been mixed with the intestinal contents of affected bees, were completely successful; nearly all the bees so inoculated were found dead after two to five days, while a few succumbed in less than 24 hours after inoculation. In all of the bees which died after inoculation the specific organism was found to be present in large numbers. In many instances the major portion of the intestinal contents of these dead bees resembled a pure culture of the organism."

Bee mortality, R. Beuhne (*Jour. Dept. Agr. Victoria, 8 (1910), No. 3, pp. 149–151*).—Further reports of the mortality of bees in apiaries along the eastern base of the Grampian mountains show that out of a total of 1,783 colonies of bees kept, 996 succumbed. The investigations as to the cause or causes of these enormous losses, which appear to occur at intervals of some years, have not proceeded far enough as yet to definitely connect them with either *Nosema apis* or *Bacillus pestiformis apis*.

Illustrations of the life history of a sawfly (Hylotoma pectoralis) injurious to willows, E. A. Schwarz (*Proc. Ent. Soc. Wash., 11 (1909), No. 3, pp. 106–109, pls. 3*).—The species here considered is stated to have defoliated willows (*Salix nigra*) along the Potomac River from Washington to Seneca, Md., a distance of about 22 miles. A certain percentage was destroyed, but all willows growing on more elevated ground were left intact. Two species of parasites, an undescribed egg parasite and *Tetrastichus hylotomæ*, were observed.

Hymenoptera for the New Jersey list of insects and other Hymenoptera, H. L. Viereck (*Proc. Ent. Soc. Wash., 11 (1909), No. 4, pp. 208–211*).—Several species are here described as new, including *Apanteles harti*, which was reared

from *Pyrausta nelumbialis* at Washington, D. C., and *Heterospilus bruchi*, from *Spermophagus robiniæ* at Forbing, La.

New parasitic Hymenoptera, J. C. CRAWFORD (*Proc. Ent. Soc. Wash., 11 (1909), No. 4, pp. 203–207*).—*Glyptocolastes bruchivorus*, a parasite of *Bruchus prosopis*, at Victoria, Tex.; *G. texanus*, bred from mesquite from San Diego, Tex., where it is probably parasitic on *B. prosopis*; *Physothorax russelli*, bred from the fruit of *Ficus aurea at* Cutler, Fla.; *Elasmus setosiscutellatus*, bred from the heads of sorghum at Dallas, Tex.; *Telenomus coloradensis*, from the eggs of *Notolophus oslari* at Colorado Springs, Colo.; and two species of Chalcis are described as new.

Habits of parasitic Hymenoptera, C. H. WITHINGTON (*Trans. Kans. Acad. Sci., 22 (1908–9), pp. 314–322, pls. 2*).—Notes on the life history and habits of *Lysiphlebus cerasaphis* and *Ephedrus rosæ* n. sp., are given.

It was found that one fertilized female *L. cerasaphis* at a mean daily temperature of 75.4° F. and under a mean daily moisture of 72.5, successfully parasitized from 39 to 105 *Siphonophora rosæ* with an average of 70.8. The length of time required for the parasite to pass from egg to adult was 16 days, with 15 to 17 days as extremes. It was also found that of the 354 parasites which emerged from this experiment, 70 per cent, or 248, were females. . . .

"It was found that one fertilized female of *E. rosæ* successfully parasitized under a mean daily temperature of 77.7°, and a mean daily moisture of 73.3, from 19 to 38 *S. rosæ*, with 53.2 as an average. The length of time required for the parasite to pass from egg to adult was 21 days, with 20 to 22 days as extremes. Of the 266 parasites which emerged, 52.2 per cent, or 139, were females."

Several other species of aphids were exposed but *S. rosæ* was the only one that either of the two parasites would attack.

Value of sodium cyanid for fumigation purposes, R. S. WOGLUM (*Jour. Econ. Ent., 3 (1910), No. 1, pp. 85–88*).—It is stated that, unknown to the consumer, sodium cyanid has been used to a limited extent in California in fumigation work for a number of years, it being styled "American" cyanid to distinguish it from "German" or potassium cyanid. Consumers have considered both brands to be potassium cyanid, the popular distinction being that one was made in America and the other imported from Germany.

Following analyses by C. C. McDonnell of the Bureau of Chemistry of this Department, the author conducted fumigation experiments in the field. He finds that in addition to a high percentage of cyanogen, it is equally important that a cyanid be practically free from sodium chlorid, and that a cyanid containing in excess of 1 per cent of sodium chlorid should be condemned. In field work, as well as in the laboratory, high grade sodium cyanid produced exactly as satisfactory results as high grade potassium cyanid.

Insecticides and fungicides, H. L. FULMER (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 76–81*).—A brief summarized account of the work with lime-sulphur washes previously noted (E. S. R., 23, p. 60) is followed by reports of analyses of samples of Paris green, white arsenic, lead arsenate, sodium arsenate, copper sulphate, and Bordeaux paste.

FOODS—HUMAN NUTRITION.

The glycogen content of beef flesh, II, P. F. TROWBRIDGE and C. K. FRANCIS (*Jour. Indus. and Engin. Chem., 2 (1910), No. 5, pp. 215, 216*).—The authors have continued their study of the glycogen content of beef flesh (E. S. R., 22, p. 760).

The conclusions which were reached follow:

"The glycogen content of beef muscle and beef liver varies from 0.1 to 0.7 and 0.2 to 3.8 per cent, respectively.

"Starvation or extreme debility does not cause entire removal of glycogen from the muscle or liver.

"The glycogen of beef liver and muscle slowly decreases, but does not entirely disappear, when kept at a temperature of 6.5° C. for over two weeks. Glycogen may be present even when liver has become unfit for food.

"Horseflesh is subject to an enzymatic hydrolysis of the glycogen similar to that of beef. The glycogen decreases slowly when the sample is exposed to temperatures of about 20–25°.

"The glycogen content can not be said to offer an absolute or even approximate basis for distinguishing beef from horseflesh."

The occurrence of a characteristic color in salt herring, C. GRIEBEL (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 8, pp. 424–426, pl. 1, fig. 1*).—From an experimental study of the subject the author concludes that the colored area sometimes observed in salt herring is derived from pigment in the eyes of marine animals which the herring has eaten. This material becomes dissolved through the agency of trimethylamin and similar bases of weak alkaline reaction and imparts a reddish brown color to the stomach contents and adjacent areas.

The subject is of interest in connection with the examination of food products for the presence of added coloring matter.

Food inspection decision (*U. S. Dept. Agr., Food. Insp. Decision 121, p. 1*).—This decision has to do with the floating of shellfish.

"Particular attention should be paid by the growers and handlers of oysters to the character of the water in which the oysters are brought to maturity or floated. Where such waters are polluted it will invariably follow that the oysters will also partake of this pollution and subsequent washing of the oysters, or even floating in water which is not polluted, is likely not to cleanse them of this pollution."

[Wheat flour and bread investigations], R. HARCOURT (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 66–76*).—Analyses and a large number of baking tests are summarized with a number of kinds and grades of winter and spring wheat grown in 1908.

As regards the nutritive value of bread from winter and spring wheat flours, comparative tests showed that a uniform quantity (12 oz.) of various spring wheat flours produced an equal weight of bread of very similar composition, while the Ontario winter wheat flour gave less bread and with from 10 to 13 gm. less protein, 1 gm. less fat, and from 6 to 11 gm. more carbohydrates. However, when the energy value was considered there was practically no difference in the two sorts of bread, and so, according to the author, "we must conclude that when bread is taken in the usual way as part of a mixed diet, bread from the soft wheat flour is nearly, or approximately, equal in nutritive value to that obtained from the hard spring wheats."

Experiments on the effect of aging upon bread making quality are also reported, in continuation of previous work (E. S. R., 21, p. 357), and it was again noticed that the percentage of wet gluten in the flour was in nearly every case lower in the aged flour than in the newer flour, as were also the figures for water absorption. On the other hand, the volume of the loaf and the quality of the bread were much superior to that from the newer flour.

The problem of blending hard and soft wheats is briefly considered and statements made regarding the work which is being undertaken regarding the in-

fluence of the stage of maturity at which wheat is cut on the baking quality of the flour, and the influence on wheat and flour of chemicals used in fumigating mills. The materials used in the fumigation work were hydrocyanic acid obtained from potassium cyanid and sulphuric acid, carbon disulphid, and sulphur fumes. "The investigation is not completed, but the indications are that the hydrocyanic acid does little or no harm to flour, while sulphur fumes totally destroyed it for baking purposes. Carbon disulphid spoiled the flour for immediate use, but on exposure for some months it regained its original quality."

The water content of wheat and rye flour, O. Rammstedt (*Chem. Ztg., 34 (1910), No. 39, pp. 337–339*).—A summary and discussion of data with reference to the quality of modern milling products and the proportion of water present and its estimation.

The nutritive value of famine bread and its digestibility, S. J. Dobroskolonsky (*Vyestnik Obshch. Hig., Sudeb. i Prakt. Med., 43 (1907), Nov., pp. 1717–1741; Dec., pp. 1839–1904; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 9, pp. 493, 494*).—Acorn bread and bread containing a large amount of weed seeds and similar materials were included in the experimental study reported. The author concludes that such foods have little nutritive value and may prove injurious.

Process of rendering bran digestible (*German Patent 953,946, April 5, 1910; Oper. Miller, 15 (1910), No. 5, p. 349*).—A process patented in Germany by D. Finkler is described, which is designed to increase the digestibility of bran. It is claimed that this is accomplished by comminuting the bran of cereals in the presence of a solution of sodium chlorid, or of sodium chlorid and lime, until the cell walls of the bran are broken.

Canned soup, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 204, pp. 15*).—An examination was made of 150 samples of canned soup, purchased in Canada, with special reference to the condition and quality of the goods.

In 7 samples the can was distinctly corroded, while in 124 cases it was in good condition. As regards soundness, 137 samples were found to be good, while 11 samples were slightly unsound. "In none, however, had decomposition proceeded far enough to be regarded as spoiled, or made dangerous in use."

"Corrosion of the can proceeds in the first place from imperfect tinning, but is naturally intensified by the acidity of the contents. In most cases the contents are faintly acid, but generally in so slight a degree as to make quantitative expression of the acidity difficult and unnecessary. In 8 samples, the acidity was sufficiently marked to permit of exact determination, and was found to represent percentages of acetic acid (weight in volume) varying from 0.046 to 0.225. Marked corrosion was noted in only one of these 8 samples (0.072 acid) and slight corrosion in another (0.127). It is evident, however, that as corrosion due to acidity proceeds, the acid is neutralized, and a fairly high acidity in the fresh soup may be compatible with strict neutrality in the same sample, after long keeping. In this case, iron goes into solution (with possible traces of tin or lead). The discoloration complained of is usually due to solution of iron, which, however, can have no poisonous effects. Lead was not found in any sample; but traces of tin were noted in 4 samples. The amount was too small to have any physiological significance."

In view of a lack of standards none of the samples examined could be considered as being technically adulterated.

"Ruddy sap," H. A. Edson (*Vermont Sta. Bul. 151, pp. 483–510*).—This work, dealing with the influence of micro-organisms on the quality of maple sirup, has been previously noted from another source (E. S. R., 23, p. 64).

Concerning the composition of coffee, III, K. GORTER (*Liebig's Ann. Chem.*, *372 (1910), No. 2, pp. 237–246*).—The author reports a number of investigations, continuing work previously noted (E. S. R., 20, p. 262).

From the data reported he concludes that citric acid is present in Liberia coffee beans, as is also trigonellin, and that the latter substance is identical with the koffearin of Paladino. He considers that the lactic acid fermentation served in the fermentation of coffee is of the greatest practical importance owing to the fact that the lactic acid formed causes the slimy material in the fruits to swell up and change its character so that it may be readily washed away.

The composition of coffee, K. GORTER (*Bul. Dept. Agr. Indes Néerland.*, *1910, No. 33, pp. 25*).—This work has been noted above and from a previous source (E. S. R., 20, p. 262).

Manufacture of chocolate, J. FRITSCH (*Fabrication du Chocolat. Paris, 1910, pp. VIII+349, pl. 1, figs. 68*).—The production, treatment, and chemical and physical character of cocoa beans, the classification of cocoas, the manufacture of chocolate and chocolate goods, and related matters are considered in this extended handbook on cocoa and chocolate.

A preliminary note on a new aspect of the effects of boric acid as a food preservative, J. BERNSTEIN (*Brit. Med. Jour., 1910, No. 2572, pp. 928, 929*).—From studies of the inhibiting effect of boric acid on different kinds of micro-organisms the following conclusions were drawn, which the author regards as tentative:

"Boric acid to the extent of 0.3 per cent (20 grains to the pound) prevents objective decomposition, such as is detectable by smell. If objective putrefaction has commenced, it inhibits further changes of this kind, possibly leading to diminution in the smell. It has a marked selective activity on the various organisms, inhibiting the growth of yeasts and organisms of the proteus group, and possibly other harmless saprophytes, though not the organisms of the coli group. Hence it seems obvious that with the aid of boric acid stale meat can be used for the making of sausages, and even meat that has already started decomposing. If, then, to such meats Gaertner's bacillus has obtained access, it will have had several days at least in which to grow, and, what is important, unhindered by the prolific saprophytes."

The author states that further experiments are in progress.

Important points in wrapping-paper designed for use in connection with foodstuffs, H. KÜHL (*Pharm. Zentralhalle, 50 (1909), No. 52, pp. 1079–1100; abs. in Chem. Ztg., 34 (1910), No. 25, Repert., p. 101*).—The author concludes that no paper is satisfactory for this purpose unless it is well calendered with glue or gelatin. Whether or not this is the case may be ascertained by putting a drop of iron chlorid solution on one surface of the paper, allowing it to remain for a short time, and then absorbing the surplus liquid with filter paper. On placing a drop of tannic acid solution at the same point on the other surface of the paper, a black spot will be noticeable if it is poorly calendered. Poorly calendered paper readily absorbs moisture and forms an excellent medium for the growth of micro-organisms.

Report of hearings on H. R. 16925, to regulate the storage of food products in the District of Columbia (*Washington: U. S. House Representatives Committee on District of Columbia, 1910, pts. 1–14, pp. 1–279*).—These documents, which are printed without revision for the use of the House Committee on the District of Columbia, contain data gathered by the subcommittee on investigation of food storage and prices with special reference to the storage of food products in the District of Columbia.

The statements included were made by the Secretary of Agriculture, by H. W. Wiley, A. M. Read, A. D. Melvin, M. C. Hargrove, J. C. Walker, and others.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 292, 293, p. 1 each; 294-296, pp. 2 each; 297, 299, p. 1 each; 300, pp. 10; 301, pp. 4; 302, pp. 2; 303, pp. 4; 304, 305, p. 1 each; 306, pp. 2; 309-311, 313, 316, 317, p. 1 each; 318, pp. 2; 319-321, 323, p. 1 each*).—These notices of judgment have to do with the adulteration of ice and desiccated egg; the misbranding and adulteration of powdered colocynth, essence of wintergreen, eggs, soft drinks containing cocaine, pepper, vanilla flavor, vinegar, lemon extract, buckwheat flour, cider vinegar, and vanilla extract; and the misbranding of drugs, sirup, metabolized cod liver oil compound, fish, a soft drink containing cocaine, vinegar, raisins, hair tonic, and canned peas; and the alleged misbranding and adulteration of calcium acid phosphate.

[Pure food topics], E. F. Ladd and Emily E. May (*North Dakota Sta. Spec. Buls. 20, pp. 115-130; 23, pp. 163-178*).—These bulletins discuss a number of general topics connected with pure food and drug work and report data regarding the analysis of miscellaneous food materials, beverages, potable waters, drugs, insecticides, paint, formaldehyde, a lawn fertilizer and weed destroyer, and lignite coal.

Food and drug inspection, W. C. Hanson (*Ann. Rpt. Bd. Health Mass., 40 (1908), pp. 557-576*). The author summarizes data regarding the character and extent of the inspection work which has been carried on in Massachusetts since 1882.

Report of the analyst, H. C. Lythgoe (*Ann. Rpt. Bd. Health Mass., 40 (1908), pp. 577-614*). Statistics are included of the examination under the state law of milk and milk products and of a large number of samples of food products of different sorts, proprietary foods, and drugs.

Diet and metabolism, M. Labbé (*Régimes Alimentaires. Paris, 1910, pp. 597, figs. 41; rev. in Brit. Med. Jour., 1910, No. 2574, pp. 1055, 1056*).—This volume, which constitutes one of the series entitled Bibliothèque de Thérapeutique, discusses general questions of food and nutrition, diet in public institutions, and related matters, and contains special sections on diet and dietetic systems in the treatment of disease.

Though the writer's general attitude is favorable to vegetarianism, he is of the opinion that a mixed diet is better tolerated.

The review in the journal cited contains a critical discussion of the theories advocated.

Studies on water drinking. II, The metabolic influence of copious water drinking with meals, C. C. Fowler and P. B. Hawk (*Jour. Expt. Med., 12 (1910), No. 3, pp. 388-410*).—Continuing an investigation previously reported (E. S. R., 17, p. 683) 3 liters of water were taken with meals for a period of 5 days by a man 22 years of age who was in a condition of nitrogen equilibrium through the ingestion of a uniform diet.

According to the authors, an increase in body weight of 2 lbs. was noted as well as an increased excretion of urinary nitrogen, the excess nitrogen being chiefly in the form of urea, ammonia, and creatin.

A decreased excretion of creatinin and the coincident appearance of creatin in the urine were also noted. "The decreased creatinin output is believed to indicate that the copious water drinking has stimulated protein catabolism. The appearance of creatin is considered evidence that the water has caused a partial muscular disintegration resulting in the release of creatin, but not profound enough to yield the total nitrogen content of the muscle. The output of creatin is therefore, out of all proportion to the increase in the excretion of total nitrogen."

An increased output of ammonia, which the authors interpreted as indicating an increased output of gastric juice, was observed, as well as a decreased excretion of feces and of fecal nitrogen, "the decrease in the excretion of fecal nitrogen being of sufficient magnitude to secure a lowered excretion of both the bacterial and the nonbacterial nitrogen."

Furthermore, the authors observed a decrease in the quantity of bacteria excreted daily and an increase in the percentage of total nitrogen appearing as bacterial nitrogen, a lower creatinin coefficient, and a more economical utilization of the protein constituents of the diet.

"The general conclusion to be reached as the result of this experiment is to the effect that the drinking of a large amount of water with meals was attended by many desirable and by no undesirable features."

The utilization of animal food by men absolute vegetarians for many years, G. Yukawa (*Arch. Verdauungskrank., 15 (1909), No. 6, pp. 740–758; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 5, p. 205*).—In the experiments reported, continuing previous work (E. S. R., 22, p. 665), two Japanese bonzes (Buddhist monks), with an average weight of 59.55 kg. and aged 21 and 32 years, respectively, who had been absolute vegetarians practically all of their lives, were given a diet containing a large proportion of beef, eggs, and milk, together with rice, salted radish, and soy sauce. The food supplied per day on an average 100.9 gm. protein, 28.4 gm. fat, and 317.2 gm. carbohydrates, the energy value being 1,981 calories. The subjects had light muscular work.

The coefficients of digestibility were protein 56.39, fat 54.39, and carbohydrates 88.66 per cent. One subject lost 1.7 gm. nitrogen and the other 2.7 gm. nitrogen during the 10 days of the experimental period. With the sudden change of diet a desire for fruit was noted as well as a loss of appetite, a feeling of lassitude, a tendency toward constipation, and a diminished amount of feces. Owing to these factors the quantity of food eaten was insufficient and there was a consequent loss in body weight. The nutrients, and particularly the protein, were not well assimilated.

According to the author, the results are what might have been expected with such a sudden change of diet. The subjects preferred their ordinary fare, and it is pointed out that the attitude toward food is important and affects gastric digestion. Having been so long accustomed to a vegetarian diet, the stomach was not in condition to secrete gastric juice with an abundance of hydrochloric acid such as is needed with animal foods. In general, the author believes that the fact that the digestive organs had been so long used to another sort of diet is to be regarded as the reason for the poor digestion and absorption of the ration containing animal food. If the change of diet had been made slowly, he believes that the food would have been more thoroughly digested. He therefore recommends that decided changes of diet be made slowly.

Studies of the influence of various dietary conditions on physiological resistance. I, The influence of different proportions of protein in the food on resistance to the toxicity of ricin and on recuperation from hemorrhage, N. B. Foster (*Jour. Biol. Chem., 7 (1910), No. 5, pp. 379–419*).—Dogs on high and low proteid rations were used in the experiments reported and their resistance to ricin poisoning was studied as well as the rate of recovery from hemorrhage.

"The impression made on the observer by these studies was that within relatively wide limits the total amount of food, as well as its total content of protein, were less important factors in determining the animal's resistance in these particular experiments than the peculiar cellular processes which, for

lack of a better and more definite term, may be called individual idiosyncrasy." Owing to the severity of the symptoms produced ricin was not satisfactory for such experimental studies.

Protein requirements of man, D. J. R. CARRACIDO (*Vet. Españ., 53 (1909), Nos. 1874, pp. 482–484; 1875, pp. 500–502; 1877, pp. 532–534*).—From the data summarized and discussed the author recommends 110 gm. protein per man per day.

Protein cleavage in the digestive tract in man, ALICE STAUBER (*Biochem. Ztschr., 25 (1910), No. 2–3, pp. 187–203*).—According to the author's results, the urea excretion determined at hourly intervals after taking food does not give a constant curve with normal individuals. In cases where there was a previous flushing out of urea the maximum urea excretion was observed in the fourth or fifth hour after taking a normal diet containing nitrogen. When nitrogen was fed in the form of products of deep-seated protein cleavage the maximum excretion was noted in one to two hours.

The author also reports data obtained under pathological conditions.

The synthesis of fat in the animal body, J. B. LEATHES (*Ergeb. Physiol., 8 (1909), pp. 356–370*).—A digest of data and discussion of the formation of fat in the animal body. See also previous articles by the author (E. S. R., 20, p. 1168).

The mother substance of glycogen, E. PFLÜGER and P. JUNKERSDORF (*Arch. Physiol. [Pflüger], 131 (1910), No. 5–6, pp. 201–301*).—From the large amount of experimental data recorded and discussed the authors conclude that there is a strong probability that the glycogen formed on an abundant proteid diet is derived from protein itself and not from fat.

[Note on glycogen formation], E. PFLÜGER (*Arch. Physiol. [Pflüger], 131 (1910), No. 5–6, pp. 302–305*).—The data presented supplement the paper noted above.

Note on overnutrition and mineral metabolism, E. BIERNACKI (*Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 6, p. 240*).—The author gives a number of corrections of the figures published in his article previously noted (E. S. R., 22, p. 370).

Some colloid-chemical aspects of digestion, with ultramicroscopic observations, J. ALEXANDER (*Jour. Amer. Chem. Soc., 32 (1910), No. 5, pp. 680–687*).—From a digest of data obtained by other investigators, his own observations with the ultramicroscope of the action of diastase upon potato starch grains and the action of pepsin upon coagulated egg albumen, and other information, the author discusses the principle of colloidal protection in digestion, and particularly the effect of gelatin or some similar substance on the digestion of protein.

According to his summary, "bald chemical analysis can not express the digestibility and availability of a food any more than it can express or explain the action of the digestive juices, or in fact any other physiological process. In all these processes can be traced the influence of the colloidal substances everywhere present in the body, whose effects are quite out of proportion to their small mass. Striking examples are the enzyms which catalyze and direct chemical and physical changes, and the protective colloids which oppose crystallization, precipitation and coagulation, emulsify fats, and facilitate diffusion and absorption. As soon as we approach the chemistry of living organism, we are confronted with problems of colloid chemistry, and there is no doubt but that a correct understanding and application of its principles will throw much light upon many other obscure problems in biology, physiology and medicine."

The relation of ptyalin concentration to the diet and to the rate of secretion of the saliva, A. J. CARLSON and A. L. CRITTENDEN (*Amer. Jour. Physiol., 26 (1910), No. 1, pp. 169–177, fig. 1*).—Experimental data obtained with both man and animals are reported and discussed.

Quotations from the authors' summary follow:

"In man weak acetic acid in the mouth appears uniformly a more efficient stimulus to secretion by the parotid than mechanical stimuli, such as dry sand, crackers, flour, or cotton. . . . Within limits the stronger the acid the greater the rate of secretion. This difference between efficiency of mechanical and acid stimuli is probably only one of intensity of stimulus. . . .

"We have made a number of determinations of the relation of concentration of the human parotid saliva to the rate of the secretion of the saliva, and find that it is the same as in the lower mammals, namely, within limits the concentration of the saliva increases with the rate of the secretion. . . .

"In man, in the case of individuals who respond readily with varying secretion rates to stimuli of varying strengths, the saliva that is secreted the fastest exhibits the greatest digestive power. . . .

"Qualitatively different stimuli in the mouth, such as acid, salt, sweet, bitter, mechanical, agreeable, disagreeable, yield no constant difference in the ptyalin concentration of the parotid saliva, unless they yield a constant and marked difference in the rate of secretion, as is the case, for example, with sand and acids. In man it is practically impossible, however, to secure uniform secretion rates in the case of the qualitatively different stimuli. Our results are therefore not conclusive on this point. But it is obvious that any investigation of the relation of ptyalin concentration or of the concentration of other substances in the saliva to different stimuli in the mouth or to different physiological states of the reflex centers must recognize the secretion rate factor."

The influence of heat on the tryptic digestion of egg albumen, J. TALARICO (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 13, pp. 662–664*).—The digestibility of raw and cooked egg albumen by trypsin was studied, the results being expressed on the basis of the amount of amido acid formed in a given time.

When raw egg white was compared with egg white cooked for varying times the cooked material was found to be more digestible than the raw. The digestibility increased at first with the length of time the cooking was continued and then again decreased, the maximum being observed when the cooking was continued for 30 minutes. When the cooking period was 10 hours the digestibility was about the same as for 10 minutes.

As regards the digestibility of egg white raw and egg white cooked for 15 minutes at different temperatures, the amount of amido acid products was the same for raw egg white and for that cooked at 60° and at 70° C. Above this temperature an increase in digestibility was noted, the maximum amount being found at a temperature of 140°, the highest experimental temperature recorded.

The effect of excluding pancreatic juice from the intestine, J. H. PRATT, P. D. LAMSON, and H. K. MARKS (*Trans. Assoc. Amer. Physicians, 24 (1909), pp. 266–281*).—From an experimental study of the question, in which dogs were used as subjects, the following general deductions were drawn:

"In every instance in which the pancreatic secretion was excluded from the intestine there was marked diminution in the absorption of nitrogen and fat. The lack of absorption was not due to the absence of a fat-splitting enzym, for the proportion of split fat in the feces was normal. The disturbance in metabolism did not develop gradually, but was noted as soon as the animal recovered from the operation. It persisted as long as the animals were under observation, which in one case was 5 months and in another 4 months. The animals lost

weight. Those that were free from postoperative complications had a ravenous appetite. The operation did not produce glycosuria. Additional evidence that the loss of fat and nitrogen in the feces was caused by lack of the external pancreatic secretion is shown by the increase in absorption when pancreatic ferments were given by the mouth. The failure of other investigators to obtain a diminished absorption of fat and nitrogen after ligating the pancreatic ducts was evidently due to the fact that pancreatic juice continued to enter the intestine."

The paper is followed by a discussion.

The amount of ammonia, phosphoric acid, acid bodies, and amino acids in urine, L. DE JAGER (*Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 7, pp. 241–255, dgms. 6*).—Data are summarized and experiments reported.

As regards the effect of diet on urine, it was noted that when the mid-day meals consisted chiefly of fish or pancakes there was an increase in acidity, and that the acid content was very low when foods containing much alkaline salts were eaten—for instance, potatoes and green vegetables. Such effects, it is pointed out, are often more noticeable on the following days than on the experimental day.

ANIMAL PRODUCTION.

Explanatory remarks concerning the normal rate of growth of an individual and its biochemical significance, T. B. ROBERTSON (*Biol. Centbl., 30 (1910), No. 9, pp. 316–320*). The author discusses the objections raised by Pearl (E. S. R., 21, p. 469), Enriques, and others, concerning the theoretical curves for expressing the normal rate of growth.

"This objection of Pearl's would be a perfectly valid one provided (1) that there were no systematic errors in the experimental determinations, (2) that there were no disturbing factors such as deposition of fat, senile decay, etc., and (3) that the constants of the theoretical curve were computed from the experimental determinations by the method of least squares," conditions not fulfilled in the present case. An additional explanation is given as follows: "The experiments of Peter and of Loeb upon the temperature coefficient of growth have shown that the velocity of growth is determined by the velocity of chemical reactions. Now the growth of an organism, as the results of a very large number of investigators have shown, undergoes, in the first part of a growth cycle, positive acceleration and, later, negative acceleration with time. . . . Only two groups of chemical reactions are known which display positive acceleration—the one group consists of the autocatalysed reactions and the other of certain catenary reactions. But the curve expressing the extent of transformation with time, in a catenary reaction, is almost invariably markedly asymmetric about its point of inflexion, whereas that expressing the extent of transformation with time in an autocatalytic reaction is symmetrical about its point of inflection. Simple inspection of the numerous published curves of growth is sufficient to assure us that the curve of growth, in any given growth circle, is almost invariably notably symmetrical about its point of inflection. We can not, I think, avoid the conclusion, from these considerations alone, that the growth of living tissues and organisms is the expression of an autocatalysed chemical reaction."

Growth and its analytical representation, P. ENRIQUES (*Biol. Centbl., 29 (1909), No. 11, pp. 331–352*).—Other formulas besides those of Robertson (see above) are suggested as applicable to represent the growth of organisms.

Experimental embryology, J. W. Jenkinson (*Oxford, 1909, pp. VIII+341, figs. 167*).—This volume attempts to sketch the progress of researches on cell division, growth, differentiation, and the external conditions that influence the development of the organism. The data submitted on cell division is taken chiefly from experiments of invertebrates and that on growth from measurements and weights of mammals.

A summary of experimental investigations up to the present time indicates that the internal factors governing development are the initial structure of the germ and the mutual relations of its parts, and that normal development is necessarily conditioned by the physical and chemical environment.

"Development then proceeds from the comparatively simple organization given in the structure of the fertilized ovum by the creation of ever-increasing complexity by the action and reaction of the parts on one another. Each ontogenetic effect produced becomes in turn the cause of further effects, the possibility of fresh specific action, for it becomes the seat of a new specific stimulus and response, and so on until the complexity of the 'ultimate organs' of the adult is achieved.

"In order, however, that differentiation may be normal it is clear that these stimuli and these responses must be accurately coordinated: the right stimulus must be ready at the right time and at the right place for the right organ to respond to."

The author points out that the development of every organ must be examined in detail by experimental methods. Although in general the views of Driesch concerning the development are endorsed, the author repudiates the doctrine of neovitalism, which postulates an immaterial entity to guide the merely mechanical forces toward the realization of the "end" to be attained in every organic process.

A bibliography is appended to each chapter.

Text-book of embryology, F. R. Bailey and A. M. Miller (*New York, 1909, pp. XIV—672, figs. 515*).—This is an extensive summary of investigations of cell and cell division, formation of the sexual elements, and development of the fetus and fetal membranes. Although written primarily for students of medicine, the development of the growing organism is treated from the comparative standpoint for those who are interested in the embryology of mammals. Directions are given for the study of amphibian, chick, and mammalian embryos.

A bibliography is appended to each chapter.

Heredity, W. E. Castle (*Pop. Sci. Mo., 77 (1910), No. 5, pp. 417–428, figs. 13; Sci. Amer. Sup., 69 (1910), No. 1797, pp. 369, 376, 377, figs. 13*).—Experiments of the author in breeding guinea pigs are used to illustrate the fundamental principles of (1) singleness of the germ in contrast to the duality of the individual; (2) blending inheritance; (3) Mendel's law of discontinuous inheritance. The view is advanced that notwithstanding the seemingly radical differences between blending and discontinuous inheritance, they may prove to have a common basis and that future experiments may show blending inheritance to be a form of Mendelian inheritance, in which many independent factors are concerned.

Some modern views concerning heredity and variation, R. H. Firth (*Jour. Roy. Army Med. Corps, 13 (1909), No. 6, pp. 633–646, figs. 3*).—This is an address before the Aldershot Military Medical Society, November, 1909, and presents in a popular form the principal facts known concerning heredity. The advantages of obtaining accurate data on the inheritance of congenital defects and abnormality are pointed out.

[The biological factor in heredity], W. BEVAN-LEWIS (*Jour. Mental Sci., 55 (1909), No. 231, pp. 591–630, figs. 5*).—A résumé of studies on Mendelian inheritance is given, in which apparent exceptions are shown to depend upon fallacies of interpretations. The desirability of studying the congenital defects and tendencies to disease in the light of Mendel's law is pointed out. Data already reported show that cerebral hernia in Polish fowl, the waltzing habit of mice, albinism in several species of animals, and probably alkaptonuria in human beings are recessive characters.

Cellular osmosis and heredity, A. B. MACALLUM (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 2 (1908), Sec. IV, pp. 145–163*).—The theories of osmosis and its bearing on heredity are discussed.

According to the view of the author, there is a membrane about the nucleus of the cell, which is so constituted as to exclude organic salts, fats, free carbohydrates, and probably free protein. The chromatin of the histologists is an iron-holding nucleoprotein, which can permeate the nuclear membrane because of its solubility in the substance of the membrane. The nuclear membrane therefore makes the transmission of ancestral characters from generation to generation possible.

"A germ plasma, in the sense implied by Weismann, may exist but on the view here advanced its continuity is one of type rather than of identical molecules, for the nuclear membranes of the germ cells sort out or select from all the iron-holding nucleoproteins from the various portions of the body that reach such germ cells those of a certain definite fixed composition and any other nucleoproteins that may be present are excluded from the nuclei of the ova and spermatid cells. Such selected or sorted out iron-holding nucleoproteins may in a manner represent the gemmules of Darwin's theory. Such compounds transmit the inherited parental characters and, to continue the transmission in the offspring of such characters, provide for the maintenance of the same type of nuclear membrane in the germ cells of the offspring." Thus, without a nucleus there could be no fixity of type or characters.

This discussion shows the importance of having a clear view of what osmosis fundamentally means from the physiological side.

The problems of inheritance from the standpoint of the mechanics of development, E. GODLEWSKI, Jr. (*Vorträge u. Aufsätze Entwickl. Mech. Organ. 1909, No. 9, pp. 301, figs. 67; abs. in Nature [London], 83 (1910), No. 2114, pp. 273, 274*). In part 1, Mendel's law of inheritance of acquired characters, nonsexual reproduction, and allied problems of inheritance are discussed. In part 2, the mechanism by which characters of one generation are carried over to the next are treated in detail. The author thinks that the relations between the nucleus and the cytoplasm, and not the nucleus itself, form the basis of heredity.

A bibliography of over 400 references on the subject is appended.

The interpretation of the term "pure bred" by breeders' associations in Germany and other countries, A. LYDTIN and A. HERMES (*Arb. Deut. Landw. Gesell., 1909, No. 157, pp. 181*).—A discussion and exposition of what is meant by the term "pure bred" by breeders' associations in all countries which publish pedigree registers. Considerable historical data are included concerning the formation of these associations and the manner in which pedigrees have been recorded.

[Stock breeding at the government farm in Trinidad], P. CARMODY (*Ann. Rpt. Dept. Agr. Trinidad and Tobago, 1908–9, pp. 8–11*).—An account of the progress made in stock breeding.

The cross between native cows and zebus, which were first imported in 1879, has been very successful. The progeny are now scattered all over the island and many have been exported to Central and South America. The domesticated buffalo has also proved successful in this climate. Of the improved English breeds of cattle imported, Red Polls have given the best satisfaction. Progress in horse breeding began in 1888, but has been slow as suitable types were not selected.

Willows as stock food and shade in summer, R. W. PEACOCK (*Agr. Gaz. N. S. Wales, 21 (1910), No. 4, pp. 330–334, figs. 6*).—An analysis of willow leaves, which are readily eaten by stock in Australia during periods of drought, is reported as follows: Water 70.9, protein 6.68, fat 1.26, carbohydrates 13.58, fiber 4.56, and ash 3 per cent.

The grape as a feed for dairy cows, G. FASCETTI and N. FOTTICCHIA (*Staz. Sper. Agr. Ital., 42 (1909), No. 12, pp. 909–917*).—This is a more detailed report of work previously noted (E. S. R., 21, p. 375).

Cattle feeds, R. HARCOURT (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 61–66*).—Analyses are reported of cotton-seed, linseed, and gluten meals, gluten feed, bran, dried brewers' grains, ground oat hulls, oat dust, ground cocoa shells, sugar-beet meal, oats, wheat, green alfalfa, silage, and many mixed feeds.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 298, 314, 315, 322, p. 1 each*).—These relate to the adulteration and misbranding of proprietary feeding stuffs.

Feeding beef steers on cotton-seed meal, on pasture, J. A. McLEAN (*Mississippi Sta. Bul. 136, pp. 11, figs. 5*).—An experiment was undertaken to obtain information on the cost of making beef in Mississippi upon summer pasture with cotton-seed meal as a supplement. A mixed lot of 20 steers was put in a wooded pasture July 15, where the feed consisted mainly of Lespedeza, Melilotus, a little white clover, and Bermuda grass. On August 14, a supplementary feed of cotton-seed meal and hulls in equal parts at the rate of 4 lbs. per head per day was given, and the quantity was increased at stated intervals until October 25, from which time each steer received 10 lbs. per day. During the entire period, which lasted until November 22, the average daily gain was 1.26 lbs. per head at a cost of 5.38 cts. per pound of gain. There was a shrinkage of 93 lbs. per head in transit to Chicago. The average profit was $6.96 per steer.

Results with a similar lot of 22 steers in a comparison of grass and hulls in connection with cotton-seed meal have been previously noted (E. S. R., 21, p. 668).

Among the conclusions are the following: "That grass is a much cheaper roughage than cotton-seed hulls to feed in conjunction with cotton-seed meal to beef steers and that, consequently, it is a safer business proposition and likely to be a more remunerative transaction to make beef during the summer months in Mississippi by feeding cotton-seed meal upon pasture than by feeding with hulls in the winter."

The dead meat trade (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1910), No. 3, pp. 411–424*).—This article gives a report of methods practiced in Scotland for finishing cattle for the London market, with a view to starting a dressed beef trade instead of selling store cattle in Ireland to be shipped and finished in England. Experiments are also reported on finishing, slaughtering, and sending the dressed meat to the London market. The average returns from these experiments ranged from 36s. 6d. to 41s. per hundredweight after deducting freight and commission charges.

Experiments in fattening sheep, J. FABRE (*Ann. École Nat. Agr. Montpellier, n. ser., 9 (1910), No. 4, pp. 289–313*).—Feeding experiments with sheep are reported in which the rations consisted of hay, alfalfa, maize, potatoes, copra cake, and sugar.

The gains were less when the nutritive ratio was 1 : 13.6 than when a narrower ration was fed. The conclusions reached were that economic fattening could take place when the nutritive ratio varied from 1 : 4 to 1 : 10, and that within these limits it is the amount of food digested rather than the nutritive ratio that determines the rate of gain.

Experiments with swine, G. E. DAY (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 141–145*).—Several experiments are reported in which the by-products of the dairy were used in rations for swine. The grain ration consisted of a mixture of ground barley and wheat middlings.

In three tests water and grain produced an average daily gain per head of 0.909 lb., 1.21 lbs., and 1.01 lbs., respectively. In three tests with pasteurized whey and grain the gains were 1.14 lbs., 1.51 lbs., and 1.38 lbs. per head per day, and with ordinary whey and grain 1.23 lbs., 1.62 lbs., and 1.43 lbs. In another experiment, which included two tests, the average daily gains per head were respectively as follows: Water and grain, 0.909 lb. and 1.21 lbs.; separated whey and grain, 1.12 lbs. and 1.39 lbs.; and ordinary whey and grain 1.23 lbs. and 1.67 lbs. These experiments indicate that pasteurized and unpasteurized whey have about equal feeding value. The experiments of the past 2 years indicate that ordinary whey has from 25 to 30 per cent higher feeding value than separated whey.

In a further trial the average gains per head per day were as follows: On water and meal 1.21 lbs., ordinary whey and meal 1.62 lbs., skim milk and meal 1.52 lbs., buttermilk and meal 1.63 lbs. The buttermilk used was superior to the skim milk in feeding value, as it contained 0.4 per cent of fat and the skim milk only 0.05 per cent.

Experiments in pig feeding, T. I. MAIRS and S. W. DOTY (*Pennsylvania Sta. Bul. 95, rev., pp. 3–16, figs. 5*).—This is a revised edition of work previously noted (E. S. R., 22, p. 475).

[Horse breeding], F. M. WARE (*Boston Evening Transcript, 1910, Feb. 26, pt. 3, p. 3; Mar. 5, pt. 3, p. 3; Mar. 12, pt. 3, p. 2; Mar. 19, pt. 1, p. 8; Mar. 26, pt. 1, p. 9; Apr. 9, pt. 1, p. 5*).—A series of articles which discuss the present condition of horse breeding in the United States, together with suggestions for its improvement.

The author thinks that more farmers in the East should undertake the breeding of draft horses, while on the other hand the breeding of trotters and thoroughbreds should be left to specialists. In breeding hunters too much attention has been paid to nonessentials. The thoroughbred has not been appreciated as a general utility horse. The author gives an account of his experience in purchasing thoroughbred fillies and fitting them for sale, together with advice to those who wish to undertake that line of work.

Studies in horse breeding, G. L. CARLSON (*Norfolk, Nebr., 1910, pp. 255, figs. 67*).—A treatise on horse and mule breeding, in which a large part of the material is drawn from the author's experience. Considerable space is given to the subjects of sterility, abortion, development of the fetus, and diseases of breeding stock.

The theory of the four stallions, W. P. WILLIAMS (*Jour. Bd. Agr. [London], 16 (1910), No. 12, pp. 992–997, pls. 3*).—Attention is called to the scarcity of horses needed by the English army for artillery and transport purposes, and illustrations given of 4 types of stallions which should be used for breeding. These are intermediate between a thoroughbred and the heavy draft breeds

and are designated as follows: Light-weight thoroughbred, strong thoroughbred, weight-carrying hunter, and artillery wheeler. The last named is the hardest type to obtain, but it is suggested that the Yorkshire coach horse, the old Devonshire pack-horse, the Irish draft horse, and the thoroughbred might be used as foundation stock.

[Report of] the professor of poultry husbandry, W. R. Graham (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 157-162*).—The difference in the percentage of egg production in favor of the cold or fresh air house during 5 years for the months of December, January, February, and March, beginning December, 1904, was found to be for 1905, 76 per cent; 1906, 8 per cent; 1907, 11.8 per cent; 1908, 15.6 per cent; and 1909, 12.4 per cent.

The egg production of early and late hatched pullets was compared. Between November 1 and July 1, April hatched pullets averaged 77 eggs each and June hatched pullets, 48 each. The cost of feeding 25 pullets and 2 males for 1 year, beginning November 1, was $29.64. The number of eggs laid was 3,053, valued at $62.34. Five hens, rated at 50 cts. each, died during the period, making the profit $30.20. Each bird consumed 19.64 cts. worth of animal food and 55.5 lbs. of grain valued at 94.12 cts.

With chicks hatched early in May and kept in a pasture, 345 consumed 4,304 lbs. of grain. The cockerels were removed when they weighed about 3½ lbs. each, and the breeding stock was taken from the pasture October 22. With other chicks reared in an orchard, 773 consumed 8,649 lbs. of grain. These were hatched and taken out at different times. These figures indicate that a 4-lb. cockerel can be raised on from 13 to 14 lbs. of grain worth about 21 cts. Other data showed that it cost from 5 to 7 cts. to hatch the chicks.

Egg records for the year 1908–9 (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1910), No. 3, pp. 507–518*).—The general average for all flocks recorded was little more than 109 eggs per bird per year. One flock of Barred Plymouth Rocks laid an average of 187 eggs per bird per annum, but this was the only flock giving more than 180 eggs. White Leghorns gave a general average of 128.5 eggs per bird, with the average of the best flock of the breed 176.8, and of the lowest flock 85. The Plymouth Rocks had the comparatively poor general average of 93.3. The only pen of Houdans for which complete returns were made showed the high average of 153.9 eggs per bird.

Farm poultry (*Quart. Rpt. Kans. Bd. Agr., 29 (1910), No. 113, pp. 137–249, pls. 7, figs. 5*).—This consists of numerous articles by various authors on the rearing, managing, and marketing of farm poultry. The information is taken from experiment station bulletins, farm papers, and other sources. Most of the experimental data have been previously reported.

Incubation and brooding, M. A. Jull (*Prov. Brit. Columbia Dept. Agr., Poultry Dept. Bul. 27, pp. 45, pl. 1, figs. 28*).—The principal topics discussed in this bulletin are the structure of the egg, development and growth of the chick, the production of eggs suitable for hatching, natural and artificial incubation, and the brooding, feeding and housing of chicks.

DAIRY FARMING—DAIRYING.

The dairy herd, G. E. Day (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 134–141*).—The record of the dairy herd for the past year is given and feeding experiments are reported.

Oats were compared with a mixture of oats and barley as a grain ration for dairy cows. In one trial the average yield of milk per head per day on the oat ration was 28.19 lbs. of milk, containing 4.02 per cent of fat. On the oat and barley ration the yield was 28.09 lbs. of milk, containing 3.94 per cent of fat.

On repeating the experiment the corresponding values were 25.79 lbs. of milk, containing 4.01 per cent of fat, and 26.09 lbs. of milk, containing 4.07 per cent of fat. As a rule the mixture of oats and barley was relished better than a ration of clear oats.

In another experiment oats gave slightly better results than bran as a grain ration. A mixture of bran and oil meal proved nearly 8 per cent higher in value for milk production, but the high cost of the meal scarcely paid for the increased yield of milk. Molac feed gave better results than bran as far as quantity of milk was concerned, but the percentage of fat was reduced. Bran gave better results than sugar-beet meal and was as a rule more palatable. Molac dairy food and Tillson's dairy food were found to be of about equal value for milk production.

Cooperative dairy work, L. H. Goddard and M. O. Bugby (*Ohio Sta. Circ. 99, pp. 8*).—An account of the work of the station in assisting dairymen to keep individual records of their cows. There is a summary of the records of the 6 herds that have been in cooperation with the station for more than a year. The average amount of milk fat produced per cow per year was 235.4 lbs., which is better than the average production of the herds throughout the State. The best of these herds made an actual profit of $46.72, and the poorest herd an actual loss of $1.22 per cow per year.

Clean and sanitary milk, W. K. Brainerd (*Virginia Sta. Bul. 185, pp. 3–22, figs. 16*).—The sources of contamination of milk are discussed and the results of experiments to determine the number of bacteria in milk produced under different conditions are reported.

Samples of milk were taken in January and February from 3 different farms, from the Virginia Polytechnic Institute stables and the experiment station stables. The results are given in the following table:

Average results of 21 bacterial counts taken every second day from January 26.

Source of milk.	Number of bacteria present per cubic centimeter.	Number of putrefactive bacteria per cubic centimeter.	Number of acid forming bacteria per cubic centimeter.	Acidity after 24 hours.
				Per cent
Farm No. 1—Hand milking	140,657	19,805	35,070	0.340
Farm No. 2—Hand milking	170,278	20,425	35,756	.378
Farm No. 3—Hand milking	276,287	40,508	87,287	.412
Institute stables—Hand milking	62,592	4,637	27,116	.210
Institute stables—Machine milking	59,750	8,535	17,271	.200
Experiment station stables—Hand milking	2,787	106	910	.120

The stable on Farm No. 3 was a relatively expensive structure, but the cows were dirty and the yard and stables untidy. At the Institute stable, when the rubber parts of the milking machine were not kept in a limewater bath, the bacterial count was abnormally large.

An attempt was made to determine the source of the bacteria found in the milk from the station barn. This test covered 6 milkings extending over a period of 6 days during May. "In this stable about 50 per cent of the bacteria were eliminated when straw bedding was well moistened. A reduction of about 25 per cent was secured when a closed pail was used in milking as compared with an open pail. About 23 per cent of the bacteria were eliminated when the flanks of well-cleaned cows were moistened." About 14 per cent of the bacteria were removed by discarding the first streams of milk. A test of the relative

value of straw and sawdust as bedding showed that on an average more than twice as many bacteria were present when the straw was used.

It is believed that the arrangement of the stable was conducive to the low counts obtained, and as it was inexpensive a brief description as to its cost is given. The bulletin also contains a discussion of city milk inspection in Virginia and suggestions for improving the milk supply of cities.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 291, pp. 2; 307, 308, 312, p. 1 each*).—These relate to the adulteration of milk and cream and the adulteration and misbranding of Neufchatel cheese.

[Report of] the professor of dairy husbandry, H. H. Dean (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 96–124*).—Corrosive sublimate, bichromate of potash, and formalin were tested as preservatives for composite cream testing. A mixture of 1 part corrosive sublimate and 3 parts potassium bichromate gave the best all-round results. The formalin preserved the samples in good condition, but difficulties arose in testing the samples. Composite cream samples kept in cold storage at a temperature of about 40° F. were in the best condition. Those kept in a warm place were inclined to mold and gave results that were too low. There did not appear to be any advantage in testing oftener than once a month. Aliquot or proportionate cream sampling gave results similar to those obtained by taking a uniform quantity from each delivery.

Tests were made on the effects of adding 10 per cent starter to raw and pasteurized cream. "The buttermilk from the pasteurized lots contained a higher percentage of fat than did the raw cream lots. These results agree with those obtained in other experiments, indicating a much greater loss of fat in the buttermilk where sour cream is pasteurized. There was not so much difference in the quality of the butter when fresh, but the raw cream having 10 per cent culture and the pasteurized lots held their flavor better when scored at the end of 2 or 3 months. The addition of a pure culture (starter) to raw cream as ordinarily delivered to creameries will no doubt improve the flavor of the butter, and in these experiments the results were practically the same as from pasteurization, with the advantage of less fat lost in the buttermilk. However, we do not think that the use of a culture, or starter, in cream will altogether take the place of pasteurization, but may be recommended where pasteurization is not practicable."

A study of 56 churnings showed that the loss of fat in the buttermilk increased with the increase of acidity in the cream at the time of pasteurization. The pasteurization temperature did not appear to affect the percentage of loss. "There was not much difference in the quality of the butter from the various lots when fresh, what difference there was being in favor of pasteurization at 180° F. The keeping quality of the butter was improved by pasteurization of the cream at from 140 to 180° F., there being very little improvement by heating the cream to 120° F. Where pasteurization is followed, we recommend having the cream as sweet as possible and adopting a temperature of 180 to 185° F."

After deducting the loss of fat and the extra expense of pasteurizing, it was found that it paid to pasteurize sour cream when the butter sold for ¼ ct. per pound more than the unpasteurized.

Several machines for printing butter were tried. The number of pound prints made from a churning were about the same, whether printed by hand or by machine, there being a slight difference in favor of the hand printing. Under the conditions at the college creamery there was no gain in time by using the machine, although the machine made prints of more uniform and neater appearance. Under average conditions the machine printer might be

an advantage where a large print trade is carried on and where the cold storage is located convenient to the churning room.

The percentages of fat and casein in milk of different breeds were slightly higher than those obtained in the previous year. The average percentage of casein by breeds was Jersey 2.67, Ayrshire 2.6, and Holstein 2.35, and that of fat was Jersey 4.91, Ayrshire 3.95, and Holstein 3.55. A high fat content and a high casein content were often associated, though this did not always occur.

In studies made of the factors which influence the percentage of casein in cheese making, a slight increase in the percentage of casein had quite a marked effect on the yield of cheese. "Up to the present time we have not been able to get milk containing a higher percentage of casein without also containing an increased percentage of fat. Hence, we are unable to ascertain the effects of increased casein alone in normal milks." An average increase of 0.15 per cent casein and 0.17 per cent fat in the milk gave an average increased yield of 3.58 lbs. of cheese per 1,000 lbs. milk. There appeared to be very little difference in the quality of the cheese as indicated by the relative scoring. The greatest yield of cheese per pound of fat in the milk was in the month of June, 2.74 lbs., and the lowest in April and October, 2.45 lbs. "Theoretically, fat and casein in the milk should govern the yield of cheese; practically, this is not always the case, as shown . . . in the month of June, where milk with comparatively low percentages of fat and casein produced a comparatively high yield of cheese, both relatively to fat and casein and absolutely per 1,000 lbs. milk."

The effect of acidity at dipping showed a slightly increased yield of cheese and a little better quality of cheese by dipping the unstirred or slightly stirred curds with an average of 0.172 per cent acid, as compared with dipping at an average of 0.192 per cent. The results of 2 years' tests gave an increased yield of cheese of over ½ lb. per 1,000 lbs. milk by not stirring the curds after or at the time of dipping, and this with no deterioration in the quality of the cheese. The average water content of samples of cheese made at the college cheesery were for the curd at dipping 50.836 per cent, green cheese 35.526 per cent, and cheese one month old 35.005 per cent. The water content of cheeses made at 6 Ontario factories was very even, averaging for the curd at dipping 41.445 per cent and for green cheese 33.898 per cent. In making cheese from overripe milk there was an average yield of 90.5 lbs. ripe cheese per 1,000 lbs. milk, while the yield from the normal lots was 91.5 lbs. per 1,000 lbs. milk. The yield of cheese per pound of fat and casein in the milk was 1.516 lbs. from the overripe lots, and 1.57 lbs. from the normal. As in previous work, the yield of cheese was slightly greater with the coarse than with the fine curd knife.

Several trials were made in making whey butter. The average result for the past 2 years were about 2¼ lbs. of butter per 1,000 lbs. of whey. The lot made from unpasteurized whey cream was the poorest in quality and deteriorated in flavor more rapidly than the pasteurized.

Factors controlling the moisture content of cheese curds, J. L. SAMMIS, S. K. SUZUKI and F. W. LAABS (*Wisconsin Sta. Research Bul. 7, pp. 72, figs. 27; U. S. Dept. Agr., Bur. Anim. Indus. Bul. 122, pp. 61, figs. 27*).—In this cooperative study, cheese was made under well defined conditions and the moisture determined at intervals in order to obtain information concerning practical methods of controlling moisture content. The methods of making experimental cheese and of determining the moisture content are described in detail.

To determine the effect of heat 4 curds were set at 86° F. and 3 were heated after cutting so that in 35 minutes they stood at 92, 98, and 104°. They con-

tained 73.6, 63.7, 62, and 57.9 per cent, respectively, of moisture 2½ hours after cutting, showing that the higher temperatures facilitated the separation of whey. Curds of sweet milk set at 86, 92, 98, and 104°, and heated so that 35 minutes after cutting they stood at 104°, differed in moisture content at first but were alike after one hour. When ripe milk was used, from 1½ to 2½ hours were required to reach the same results. With milk of lower acidity the initial rate of removal of moisture was less than in the preceding experiments.

Heating the vat to 104° and 110° soon after cutting showed that at both temperatures early and rapid heating caused more rapid separation of whey during part of the first hour, but after the first hour the separation of moisture was slower than when the ordinary method of heating was used. There was a greater loss of fat in the whey and a smaller yield of cheese from each of the more rapidly heated vats instead of a larger yield. With milk of a lower acidity the results showed that the different methods of heating had a marked effect on the moisture content early in the process, but owing to lack of acidity the curds all practically stopped firming when the moisture content reached about 65 per cent. The differences in moisture content so marked at first were thus lost.

"Four curds cut with ¼, ⅜, ½, and ⅝ in. curd knives, respectively, contained 49.7, 52.9, 58.2, and 69.8 per cent of moisture 2½ hours after cutting, showing how great differences of moisture content are produced by using different knives."

The rate at which curds lost moisture after cutting was not affected by variations in the proportions of rennet extract between 2 and 6 oz. per 1,000 lbs. of milk. It was found, however, that the cheese maker can save time by using more rennet.

A moderately high acidity induced a rapid separation of moisture. When the acidity was above 0.18 per cent the rate of separation increased but little. Thus, curds made from very sweet or overripe milk retained a larger proportion of moisture than curds from milk of medium ripeness.

"To insure so far as possible that 0.17 per cent of acid, instead of 0.15 per cent, for example, is present in the whey by the time the curd is firm enough to dip without unnecessary loss of fat, the cheese maker has to judge for himself before adding rennet whether acidity is increasing at a suitable rate."

Milk set at 0.19 per cent acidity after pasteurizing gave up its whey at about the same rate as the sweet milk set at 0.17 per cent. There was a slight increase of whey acidity in the latter, but none in the former. From this it appears that the rate at which moisture separates from the curd when the milk is pasteurized is about the same as when the milk is sweet and practically uninoculated with bacteria.

"Pressure applied to curd in the press, on the rack, or under the whey hastens the separation of whey. On account of the buoying effect of the surrounding whey, the pressure of curd cubes on each other when allowed to settle under the whey is too slight to hasten the separation of moisture from curd. If the whey be mostly removed from the vat one-half hour before matting, so as to leave the curd under the pressure due to its own weight, whey is rapidly expelled. A little whey left in the bottom of the vat at this time helps to prevent matting.

"When curd is piled on the rack its weight is great enough to expel moisture at an increased rate, until the moisture content reaches about 38 per cent, or until the process is stopped by matting. Stirring a curd on the rack prevents matting. When a curd is well stirred its final moisture content depends to a great extent on its acidity."

"The withdrawal of part of the whey from the vat soon after cutting does not affect the rate of separation of whey from curd, but the remaining whey rises more rapidly in acidity as a result of such withdrawal."

The effect of stirring when on the rack, in curds of equal acidity but varying in moisture content, was to bring the moisture content to the same figure, but this was not the case when the acidity varied. Stirring the curd on the rack prevented matting. When a curd was well stirred the final moisture content depended to a great extent on its acidity.

Among the conclusions drawn are the following:

"Variations in the fat content of milk, within ordinary limits, influence only very slightly the rate at which whey separates from curd, the presence of more fat tending to retard the process.

"Variations in the percentage of casein or water in milk within ordinary limits have a corresponding influence on the rate of moisture separation, the tendency being always toward the production of cheese with uniform moisture content. The addition of water to milk does not increase the moisture content of the resulting cheese, as the curd from watered milk gives up moisture more rapidly after cutting.

"The loss of moisture immediately after cutting is rapid, but decreases in speed as time passes. The rate is increased when the curd is taken out of the whey and piled. After this it is rapidly decreased and is again increased when the curd is salted. The loss of moisture, per pound of moisture in the curd, is greatest at the time the curd is taken out of the whey and piled."

"High acidity and high temperature induce rapid separation of the whey immediately after cutting. If the surface layers of the cubes are dehydrated by too rapid initial whey separation, so as to form a skin covering an interior pulp, the subsequent separation of whey is delayed. The yield of cheese is decreased, due to an excessive loss of fat through the broken curd walls, when such curds are taken out of the whey. Curds from overripe milk should be heated later and more slowly after cutting than curds from sweet milk, in order to avoid the skin-and-pulp condition, to insure complete removal of whey, and to avoid unnecessary loss of fat."

"During ripening the acidity of whey within curd cubes rises much faster and higher than that of the whey surrounding the cubes, because the principal seat of acid formation in the cheese vat is in the curd; whey gains most of its acidity from the curd."

The influence of lactic acid on the quality of cheese of the Cheddar type, C. F. DOANE (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 123, pp. 20, figs. 2*).—Thirty-four lots of cheese were purchased in July and August, each lot consisting of 8 cheeses, one-half of which were stored in a room at 32° F. for various periods, ranging up to 2 weeks, and the other half similarly placed in a 40° room. In January when these cheeses were scored most of them were tainted, sour, or of undesirable texture. The average score on flavor for the high acid cheese was 27, while the average on the normal acid cheese was 31.

In another study high acid cheese was made from exceptionally good milk in order to determine the effects of storage on this quality of product. Nine lots were made with varying amounts of acid. The quality of these cheeses was injured in about the same proportion as the amount of acid developed.

In another experiment 2 lots of cheese were made each day on 8 days from vats of divided milk. One of these lots was worked with sufficient acid in the whey to make a light acid cheese, and the other worked on the same day in the regular way for that factory. The cheese maker in charge of the factory set his milk and drew the whey somewhat sweeter than is customary among the best

cheese makers, but the curd was allowed to develop the acid on the rack until all danger of gas had passed. A study of the scores shows that high acid had a markedly injurious influence on the flavor. The bad flavors present in the cheese made up sweet were in every case less pronounced than in those of the same lot which was made up acid. Other bad flavors appeared in the acid cheese that were not apparent in the cheese made normally.

These results all indicate that it is poor policy to develop high acidity in the whey as an antidote for bad flavors. High acidity in the matted curd, however, is needed to exclude undesirable bacteria, and three times the amount of acidity can be developed in the matted curd as in the whey without apparent injury. The high acid cheeses which were put into storage immediately scored higher than those which remained for a time in the factory curing room. In so-called "dead sour" cheese early storage minimized the damage but was not a cure.

Losses in making cheese from normal and overripe milk, R. HARCOURT (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 81-83*).—A report of a cooperative experiment in connection with 7 cheese factories, made in order to discover the nature of the losses when making cheese from overripe milk.

The results obtained were not uniform. In some cases the loss of protein and fat from overripe milk was greater than from the normal, and sometimes the reverse was true. The variation was greater in the case of the fat than in that of the protein, but in nearly every instance the differences between the losses from normal and overripe milk were very small.

On the whole the loss of solids was no greater in making cheese from overripe milk than from normal milk, although there was nearly 1 lb. less of cheese from 100 lbs. of milk.

Home cheesemaking, W. J. ELLIOTT (*Montana Sta. Circ. 1, pp. 8, figs. 2*).—This circular was published in response to a demand from people within the State who wish to make farm cheese to be used in the home or for sale in the local market. Directions are given and the implements necessary are illustrated and described.

VETERINARY MEDICINE.

Proceedings of the forty-fifth annual convention of the American Veterinary Medical Association (*Proc. Amer. Vet. Med. Assoc., 1908, pp. 19-420, pls. 9*).—A general account of these proceedings has been given (E. S. R., 20, p. 199).

Under the report of the Committee on Diseases appear papers by V. A. Moore on The Control and Prevention of Bovine Tuberculosis in Individual Herds (pp. 82-89); by J. R. Mohler on Recent Studies Regarding the Causation and Character of Animal Tuberculosis (pp. 89-102); by O. E. Dyson (pp. 102-106) on The Relation of Economics to Tuberculosis in Animals (E. S. R., 22, p. 387), and by H. J. Milks on The Prevalence and Control of Tuberculosis in the South (pp. 107-112). Under the report of the Committee on Intelligence and Education appears a paper by D. A. Hughes on The Veterinary Sanitary Laws and Regulations of the Several States, How their Formation and Administration Exhibit the Progress of Veterinary Intelligence and Education in the Different Sections of the Country (pp. 139-172).

Following an address by N. Kaumanns, Imperial German Special Commissioner for Agriculture, papers were delivered by F. J. Mayer on The Important Relation of the Veterinarian to Public Health (pp. 248-258); N. S. Mayo on the Transportation of Live Stock (pp. 259-262), and C. H. Jewell on Shipping Fever (pp. 263-268), previously noted (E. S. R., 21, p. 183). A paper on A Clinical Examination of the Blood of Glandered Horses was presented by S. H.

Burnett and C. D. Pearce (pp. 270–282), who conclude that more or less anemia is generally present in cases of glanders, that in serious cases the anemia may be masked by a polycythemia due to concentration of the blood by loss of fluid from it. "Leucocytosis is present in active cases. The increase in leucocytes is due to the polymorphonuclears. The other varieties are usually not increased. The more severe the case, the greater the increase in the number of polymorphonuclears. Absence or a very great decrease in the number of eosinophiles is found in severe, actively progressive cases."

Papers followed by H. D. Gill on Glanders in the Metropolitan District of New York (pp. 283, 284); W. P. Ellenberger on The Eradication of Cattle Ticks in the South (pp. 296–305); R. A. Ramsay on The Work of the Bureau of Animal Industry in the Eradication of Scabies in the Western States (pp. 308–312); A. D. Melvin (pp. 314–320) on Control of Hog Cholera by Serum Immunization (E. S. R., 20, p. 881); R. A. Archibald on Opsonic Therapy (pp. 322–326); J. V. Newton on Rabies (pp. 327–331); H. S. Smith on Trypanosomes and the Trypanosomiases (pp. 332–338); F. C. Grenside on Pustular Eczema in Horses (pp. 339–342); C. C. McLean on Milk and Milk Inspection (pp. 346–351); G. E. Griffin on The Army Veterinarian and Others (pp. 358–363); S. J. J. Harger on The Bier Treatment (pp. 365–371); W. R. Blair on The Pathological Effects of Captivity on Wild Animals (pp. 372–380); D. A. Hughes on The Making of American Veterinary History (pp. 381–388); C. G. Lamb on Our Personal Responsibility to the Profession (pp. 389–392); J. Spencer on Pyæmic Arthritis (pp. 393–399), previously noted (E. S. R., 21, p. 486); A. T. Kinsley on The Significance of Pathology to the Practitioner (pp. 400–404) G. R. White on Shifting Lameness (pp. 405–413); B. Rogers (pp. 414–417) on Tuberculosis—Tagging Association Test (E. S. R., 22, p. 390), and S. J. J. Harger on The Clinic (pp. 418–420).

Report of the veterinarian health board for 1908, P. HANSEN (*Aarsber. Vet. Sundhedsr., 1908, pp. XVIII+186+136*).—Extracts of opinions, rendered by the board, on veterinary problems arising during the year are given in Part 1 of the report, and statistical tables of contagious diseases, laws, rulings, etc., in Part 2.

Report of the chief of the veterinary section, P. CONACHER (*Mozambique Dept. Agr. Bul. 1, pp. 25–30*).—The occurrence of animal diseases in Portuguese East Africa is briefly noted.

Colonial veterinary science, A. THEILER (*Vet. Jour., 66 (1910), No. 419, pp. 295–303*).—This is an address delivered before the Royal Veterinary College, Dublin, October, 1909, in which the present status of veterinary medicine in South Africa is reviewed.

Contributions to experimental pathology and chemotherapy, P. EHRLICH (*Beiträge zur Experimentellen Pathologie und Chemotherapie. Leipsic, 1909, pp. VII+247*).—This work is divided into four parts: Investigations in regard to specific therapeutics, the present status of carcinoma research, contributions to modern chemotherapy, and the partial function of the cell.

Studies in immunity, P. EHRLICH ET AL., trans. by C. BOLDUAN (*New York and London, 1910, 2. ed., rev. and enl., pp. XI+712, figs. 23*).—This, the second English edition (E. S. R., 18, p. 80), contains the new studies of Ehrlich and his coworkers, thus bringing it up to date, and in addition, includes some of the very early studies for the purpose of refuting some of Bordet's immunity theories.

About the varieties of normal opsonins, H. CHYOSA (*Arch. Hyg., 72 (1910), No. 3, pp. 196–200; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 4, p. 187*).—In order to determine if a normal serum contains a single specific

opsonin or numerous opsonins the author made several tests with various bacteria.

From the results it is seen that normal opsonins are specific. By pretreatment of a normal serum with a definite variety of bacteria the opsonic power of the serum for that variety of bacteria becomes diminished but no influence could be noted on other kinds of bacteria.

Are alexins antienzyms of the leucocytes? F. Yoshinaga (*Arch. Hyg., 72 (1910), No. 3, pp. 182–190; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 4, p. 187*).—Serum from rabbits' blood which was rendered leukemic showed a greater bactericidal power than ordinary blood serum. From this it can be concluded that the alexin content of the blood is dependent upon the leucocyte content. Dissolution of the leucocytes in vivo by injection of leucocidin produces a stimulation of the bactericidal capacity of the serum. In vivo the leucocytes exhibit twice the phagocytic power which they do in vitro. Leucocytic extracts prepared at from 50° to 15° C. from killed leucocytes have a greater bactericidal capacity than either blood plasma or the wash water obtained by washing living leucocytes.

The histological evidence that toxins reach the spinal cord via the spinal roots; with special reference to plasma cells, D. Orr and R. G. Rows (*Jour. Mental Sci., 56 (1910), No. 232, pp. 86–89; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 1, pp. 27, 28*).—This work has special reference to the plasma cells and the avenues by which the toxins reach the spinal cord. The authors found that the toxins are carried along the nerve sheaths and thus traverse the perineural lymphatic vessels and eventually penetrate into the nerve bundles. In this way they destroy the vascular elements of the nerve, the nerves themselves, and the root ganglia.

Tests in regard to the manner in which anthrax serum acts, O. Bail (*Folia Serol., 4 (1910), No. 2, pp. 123–144; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 1, pp. 29, 30*).—The author sought to solve the problem of the action of anthrax serum on the basis of the aggressin hypothesis. The results with guinea pigs and in vitro show that it is possible to render the serum of immunized animals inactive by injecting or adding aggressins.

Cancer in man and animals, E. F. Bashford (*Berlin. Klin. Wchnschr., 46 (1909), No. 36, pp. 1637–1642, figs. 3; abs. in Hyg. Rundschau, 20 (1910), No 10, pp. 566–568*).—A discussion of the results of modern cancer research with particular reference to the results obtained at the London Imperial Cancer Research Institute.

The zoological position of the causative agent of epizootic lymphangitis, L. Panisset (*Rev. Gén. Méd. Vét., 15 (1910), No. 175, pp. 378–384*).—A critical review of the investigations of this micro-organism.

Further notes on differences in precipitins produced by tubercle bacilli, E. R. Baldwin (*Jour. Med. Research, 22 (1910), No. 2, pp. 293–299*).—"The apparent differences between precipitins produced by filtered extracts of tubercle bacilli and the extracted residues are not fundamental. By prolonged or repeated treatment of the sera with the residue or extract the precipitins for both can be absorbed. Quantitative differences in the antigen or precipitinogen and its absorbability by the animals explains in great part the difference in the resulting sera, as well as the physical and chemical conditions present in the tests in vitro."

The preparation of sera rich in antitubercular antibodies by repeated injection of tubercular antigens, A. Calmette and L. Massol (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 2, pp. 48–50; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 1, p. 30*).—Tuberculin prepared by the authors, when repeatedly injected into horses, produce tubercular antibodies in the serum.

The amount of antibody measured by the deviation of complement was found to be variable and was dependent upon the manner in which the injections were made. The sera of animals infected with living bacteria (from either man or horse) showed the same content of antibodies as from those animals which were treated with smaller amounts of tuberculin. Both sera, however, did not precipitate tuberculin and did not show any neutralizing power in vitro. Even though the injection of bacterial extracts into cows gives these animals a certain degree of resistance against tuberculosis the sera do not possess any antitoxic action towards tuberculin.

A contribution to the question of cattle immunization and the transformation of the human into the bovine type of tubercle bacillus, E. R. BALDWIN (*Jour. Med. Research, 22 (1910), No. 2, pp. 301–313*).—The following conclusions have been drawn from the observations here recorded: "Virulent cultures grown directly from human sputum may cause active infection in the bovine species when inoculated intravenously. The disease is generally localized and becomes healed, but is of sufficient danger to preclude such methods of immunization for cattle. The disease may remain latent in the cow and later become active in a local focus, possibly owing to parturition, lactation, or trauma. A culture of typical human type when sojourning and presumably multiplying in the bovine tissues for 19 months may retain its original morphology and virulence for guinea pigs and rabbits, yet not necessarily exhibit an increased virulence. It may also retain the ability of the human type to produce an acid reaction in broth cultures."

A report of the use of antiformin for the detection of tubercle bacilli in sputum, etc., R. C. PATERSON (*Jour. Med. Research, 22 (1910), No. 2, pp. 315–321*).—"Antiformin provides a cheap, easy, and efficient method of examining sputum in which tubercle bacilli are suspected or are few in number. Solutions of antiformin which will kill ordinary contaminating organisms leave tubercle bacilli intact, thus enabling us to cultivate the bacilli direct from sputum or to make inoculation experiments more certain by eliminating the chances of sepsis. Antiformin is useful for the examination of feces, urinary sediment, pus, and blood for tubercle bacilli."

Note on the condition known as "white flesh", A. M. TROTTER (*Jour. Compar. Path. and Ther., 23 (1910), No. 1, pp. 50–52*).—It is concluded that this condition of the muscular tissue is simply due to the lack of pigmentation and therefore may be safely passed as fit for human food.

The pathological anatomy of bacillary pyelo-nephritis of cattle, M. RITZENTHALER (*Jour. Méd. Vét. et Zootech., 61 (1910), Jan., pp. 8–14; Feb. pp. 65–84; Jour. Compar. Path. and Ther., 23 (1910), No. 1, pp. 33–50*).—Previous investigators of this comparatively frequent affection of cattle, the history of which is of recent date, have paid particular attention to the various clinical symptoms or to the causal agents and micro-organisms, very few having directed their attention to the histology of the lesions. In this paper, following a brief review, the author presents an account of the alterations met with in 88 cases, in 28 of which a thorough microscopic examination was made.

"Numerous experiments have been made with the object of discovering the method of infection, but none has so far had absolutely positive results. It is generally admitted, however, and it is also my own opinion, that the bacilli reach the bladder by way of the urethra, multiply there, and by degrees reach the kidneys by passing up the ureters."

Schütz's vaccination for hemoglobinuria on bovines (*Veröffentl. Jahres-Vet. Ber. Tierärzte Preuss., 8 (1907 [pub. 1909]), pt. 2, pp. 20, 21; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 7, p. 154*).—A report on the value of vaccination for preventing hemoglobinuria amongst bovines. Vaccinating

each spring confers permanent immunity, while vaccinating only once protects at the most for only one year.

[A new treatment of virulent forms of mastitis], J. SCHMIDT (*Maanedskr. Dyrlæger 21 (1909), No. 18, pp. 492, 493; abs. in Vet. Rec. 22 (1910), No. 1124, pp. 489, 490*).—A new treatment for severe forms of inflammation of the udder, successfully used by the author, is that of infusing a mixture of equal parts of alcohol and glycerin into the affected quarter.

As a rule 250 gm. (approximately 8 oz.) is injected at once. If it appears possible that the affected quarter may again become functional for milk production, the author dilutes the above mixture with one-third of normal saline solution, in order not to irritate the mammary epithelium too much. The affected quarter is not milked out during the 3 days following the infusion. If two or more quarters are affected, the treatment is practiced upon only one quarter. The author finds that this treatment is accompanied by a substantial improvement in the animal 3 or 4 days after its application. It is stated that usually the animal's life is preserved, though it is not always possible to restore milk production to the affected quarter.

Cattle in the West Indies, D. W. MAY (*Porto Rico Hort. News, 3 (1910), No. 4, pp. 59, 60*).—The fact that cattle ticks are not so plentiful in Porto Rico as in the Southern States the author considers due in large part to a blackbird which follows the cattle about, picking off the ticks. This bird has been observed grasping the tail with both feet and feeding upon the ticks infesting the hind quarters of the animal; it is said that it will also stand on the ground beneath the animal and jump up to pick off the ticks. While the ticks will attach to the zebu cattle, they are seldom found in numbers on animals with zebu blood.

"Doubtless tick fever exists in Porto Rico, but of the 50 head of cattle brought from the States and which were at the station, only 3 had been inoculated. No losses occurred from tick fever although the cattle were infested from the start with ticks. Either the disease is in a much milder form than in the Southern States or else there is some virtue in the Malojillo grass which forms the main feed."

Serum treatment of infectious calf pneumonia (*Veröffentl. Jahres-Vet. Ber. Tierärzte Preuss., 8 (1907 [pub. 1909]), pt. 2, pp. 14, 15; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 7, p. 154*).—The serum treatment furnishes good results only when it is begun early, the best time being directly after birth.

Anthrax in the pig, EGGEBRECHT (*Ztschr. Fleisch u. Milchhyg., 20 (1910), No. 4, pp. 127; abs. in Ann. Méd. Vét., 59 (1910), No. 3, p. 184; Vet. Rec., 22 (1910), No. 1133, p. 632*).—A case which was brought to the abattoir with symptoms of exhaustion and great weakness is reported. The only abnormalities found were pleurisy, sero-fibrinous peritonitis, and the condition of the blood, which was black and not coagulated. Tokishige of Tokio reports cases of porcine anthrax to occur in Japan that are only manifested by such symptoms as weakness, loss of appetite, etc.

Experiments with variola of swine, J. POENARU (*Bul. Soc. Cent. Méd. Vét., 87 (1910), No. 6, pp. 144–147, fig. 1*).—Swine pox was found to be transmitted at times with the blood from cadavers and from diseased pigs to healthy ones, also through the inoculation by scarification of material from pustules. Dodd's spirochetes did not appear in the blood nor in new vesicles, but were later found in ulcers as accessory organisms.

The treatment of surra in horses by means of arsenic and its derivatives, J. D. E. HOLMES (*Parasitology, 3 (1910), No. 1, pp. 73–107*).—This article has been noted from another source (E. S. R., 22, p. 686).

A comparative study of intestinal steptococci from the horse, the cow and man, C. E. A. WINSLOW and G. T. PALMER (*Jour. Infect. Diseases, 7 (1910),*

No. 1, pp. 1-16, figs. 4; abs. in Science, n. ser., 31 (1910), No. 797, pp. 551, 552).—"The commonest streptococci in human feces are *S. mitis* (acidifying dextrose and lactose), *S. fæcalis* (dextrose, lactose and mannit) and *S. equinus* (dextrose alone). In the feces of the cow *S. equinus* and *S. mitis* are present; but *S. fæcalis* is absent and a form rare in human feces, *S. salivarius* (dextrose, lactose and raffinose), is fairly abundant. In the feces of the horse practically all the streptococci present are of the *S. equinus* type."

A contribution to the clinical study of infectious typho-anemia, L. Dupas (*Rev. Gén. Méd. Vét., 15 (1910), No. 171, pp. 129-136, fig. 1*).—A detailed account of two cases, one of which recovered, that occurred among army horses stationed near Sedan, France.

The etiology of intestinal congestion in the horse, H. Carré (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 6, pp. 358, 359*).—The author finds that intestinal congestion in the horse is due to the Preisz-Nocard bacillus, the toxins of which cause the lesions.

The susceptibility of the dog to African horse sickness, J. M'Fadyean (*Jour. Compar. Path. and Ther., 23 (1910), No. 1, pp. 27-33*).—"There are recognized horse sickness areas or districts, in which the disease recurs with greater or less severity every year, but even in the worst of these areas it prevails only during the summer and autumn months and, so far as the occurrence of fresh cases is concerned, it disappears with the onset of cold weather, and is unknown for more than half the year. These facts can be partially explained by assuming that the virus of horse sickness has an invertebrate as well as a vertebrate host, and that the former, probably a mosquito, is the agent by which the disease is transmitted to horses." This disease differs from the diseases caused by trypanosomes and piroplasms in that the virus is entirely destroyed or eliminated from the body and the recovered horse is incapable of serving as a fountain of infection for the hypothetical transmitting insect. Thus it remains to be determined where in a horse sickness district the virus of the disease is during the 6 or 8 months which separate successive annual outbreaks.

The idea of Edington that heartwater could be produced in goats, sheep, and cattle by inoculating them with horse sickness blood has been disproved by Theiler and Stockman. These workers pointed out that the 2 diseases have a different range in South Africa and that heartwater is tick-borne and only occurs in those parts of the Transvaal where *Amblyomma hebræum* is present. Theiler has shown that the disease can not be produced in cattle and sheep through injections of horse sickness blood, that only in exceptional cases can the goat be infected, and that the injection of blood into goats does not confer any immunity against heartwater.

The work of Theiler, who conducted experiments and came to the conclusion that it is possible to transfer horse sickness to dogs and transmit the virulence from dog to dog, is reviewed and experiments carried on by the author with the object of obtaining further evidence as to the susceptibility of the dog to horse sickness are reported. It is pointed out that the results obtained by Theiler were brought about by the intravenous injection of undiluted and unfiltered horse sickness blood injected directly into the veins. On the basis of experiments personally conducted in which the filtrate obtained from diluted blood passed through a Berkefeld filter was subcutaneously injected, the author concludes that "in view of the resistance which the dog offers to experimental infection with the horse sickness virus, it is improbable that animals of that species are ever infected in natural circumstances, or that in horse sickness districts the canine species can constitute a 'reservoir' for the infection of horses through the medium of an insect. Further investigations are necessary to show what

becomes of the virus of horse sickness during the healthy months of the year, but it may be observed that one is not obliged to conclude that it is perpetuated in the bodies of animals other than the horse. It may be carried over from one generation of invertebrate host to the next."

Four cases of diabetes in the dog, A. LANFRANCHI (*Abs. in Vet. Jour., 65* (*1909*), *No. 411, p. 488*).—In the cases reported the author attributes a great etiological influence to intensive alimentation and lack of exercise. Alterations of the liver seem to play the chief rôle.

Enzootic ulcerous keratitis in dogs, CADEAC (*Jour. Méd. Vét. et Zootech., 61* (*1910*), *Jan., pp. 15, 16; abs. in Vet. Rec., 22* (*1910*), *No. 1136, p. 678*).—The author describes an enzootic ulcerative keratitis in dogs which rages in low and marshy localities. It affects hunting dogs nearly exclusively, those which hunt in marshes being particularly subject to it. If treated immediately by an antiseptic (bichlorid of mercury 1 in 2,000) the ulceration may retrogress and the animal recover, but this termination is rare. Despite the negative results of microscopical examination, the author thinks it probable that the ocular infections are sequels of a relatively benign attack of piroplasmosis.

The Filaria immitis in Transcaucasian dogs, GOGEL (*Abs. in Vet. Rec., 22* (*1910*), *No. 1133, pp. 631, 632*).—In 1908, the author found *Filaria immitis* extensively disseminated among the dogs of Transcaucasia. Of those at his disposal for examination, he found that 66.7 per cent were hosts of this parasite.

Spirochetosis in fowls in Queensland, S. DODD (*Jour. Compar. Path. and Ther., 23* (*1910*), *No. 1, pp. 1–17*).—This is a detailed account of investigations of a disease of poultry occurring in the vicinity of Rockhampton, which as previously noted (E. S. R., 22, p. 783) was found to be spirochetosis. The disease is said to have occurred in that locality for several years, the average death rate among infected birds varying from 60 to 90 per cent.

"Eleven birls were artificially inoculated with blood of fowls suffering from spirochetosis, and 9 were exposed to natural tick infection. Of the former, the whole reacted to a greater or lesser degree of severity. Of these, 5, or 45.45 per cent, died from the acute form of spirochetosis, while two, or 18.18 per cent, died from the chronic form, making a total mortality of 63.63 per cent. Four, or 36.36 per cent, of the 11 fowls recovered more or less completely, although in the case of two, owing to their being stolen, their history could not be followed up. Of the 9 fowls exposed to natural tick infection, 5, or 55.5 per cent, became infected and spirochetes were demonstrated in their blood. Three, or 33.3 per cent, at no time showed the presence of spirochetes on microscopical examination of their blood, but subsequently died after showing symptoms of the chronic form of the disease, making a total of 8 deaths, or 88.8 per cent."

The author considers it probable that a single infected tick is sufficient to infect a fowl. In one instance a fowl, infected by ticks which had fasted for 7 months and 6 days, died with symptoms of chronic spirochetosis, although the casual organisms could not be demonstrated microscopically.

It was found that one-fifteenth of a grain of soamin dissolved in 1 cc. of sterile water injected intramuscularly usually modified and shortened the attack of spirochetosis, recovery being rapid and complete, and but one case of the chronic type supervening.

The development of Spirochæta gallinarum, S. VON PROWAZEK (*Mem. Inst. Oswaldo Cruz, 1* (*1909*), *No. 2, pp. 79, 80, figs. 7; abs. in Vet. Rec., 22* (*1910*), *No. 1143, p. 788*).—From studies conducted in Brazil, the author concludes that *Argas miniatus* is a true intermediary host of *S. gallinarum*.

From October, 1908 to January, 1909 smears taken from infected ticks and stained by Löffler's process were examined almost daily. It was found that "spirochetes first appeared in the opaque, leucocyte containing fluid from the body cavity of the tick about 3 days after infection, and in the salivary glands

about 14 days after infection. The spirochetes pass through developmental stages in the fluid of the body cavity, where the author succeeded in following their reproduction by multiple longitudinal divisions. The resultant forms are very fine and slender; and resting stages are also observed. Longitudinal division also occurs in the salivary glands. No spirochetes could be found in the ova."

Guinea-worm in domesticated animals, R. T. LEIPER (*Jour. Trop. Med. and Hyg.* [*London*], *13* (*1910*), *No. 5*, *pp. 65*, *66*).—A mature guinea-worm is reported to have been found in a leopard in Northwest Rhodesia, although dracontiasis had not previously been observed in Africa south of the equator. The occurrence of this parasite in the lower animals is reviewed, and it is shown that there is little doubt but that the guinea-worm is able to infest and attain maturity in the dog and horse, if not in all domesticated animals.

The classification of the piroplasms, with a description of two new species, C. FRANÇA (*Arch. R. Inst. Bact. Camara Pestana*, *3* (*1910*), *No. 1*, *pp. 11–18*, *pl. 1*; *abs. in Bul. Inst. Pasteur*, *7* (*1909*), *No. 23*, *pp. 1029*, *1030*).—The author considers the piroplasms to constitute a family, Piroplasmidæ, with 5 genera, namely: Piroplasma containing *P. bovis*, (=*P. bigeminum*), *P. ovis*, *P. canis*, *P. pitheci*, *P. muris*, and *P. avicularis*; Theileria, including *T. annulata*, *T. parva*, *T. mutans*, and *T. dama*; Nicollia, including *N. quadrigemina*; Nuttallia, n. g., including *N. equi* and *N. herpestedis*; and Smithia, n. g., including *S. microti*, n. sp., a parasite found in the blood of a field mouse (*Microtus incertus*) from the vicinity of Lisbon.

A bibliography of 24 titles is appended.

The biological detection of echinococcus disease, J. PUTZU (*Centbl. Bakt.* [*etc.*], *1. Abt.*, *Orig.*, *54* (*1910*), *No. 1*, *pp. 77–94*).—In 5 out of 8 cases diagnosed clinically as echinococcus disease, the Bordet-Gengou complement binding reaction was positive in 4 instances and negative in 1, while with the seroprecipitin test 3 were negative and 2 positive. In the 3 other cases, which on autopsy showed no evidence of the disease, the complement binding reaction was absent in all instances, while the seroprecipitin reaction was twice positive and once negative. In this work it was found that the best antigen was hydatid fluid from sheep.

The bionomics of helminths, W. NICOLL (*Brit. Med. Jour.*, *1910*, *No. 2582*, *pp. 1529–1534*).—A paper read before the Society of Tropical Medicine and Hygiene.

RURAL ENGINEERING.

Irrigation experiments and investigations in western Oregon, A. P. STOVER (*U. S. Dept. Agr.*, *Office Expt. Stas. Bul. 226*, *pp. 68*, *figs. 13*).—The physical characteristics of the Willamette, Umpqua, and Rogue River valleys are described, the streams and stream flow, topography, soils, and climate of each are discussed, and experimental investigations conducted at several points in the Willamette Valley are reported, in which the irrigation and cultural methods employed are described, directions given for the preparation of land for irrigation, and the climatic conditions during the period of the investigation stated in full.

In experiments conducted in cooperation with the Oregon Experiment Station at Corvallis, the effects of water were noticeable at once in the increased vigor of the plants, although, as at other points, it was difficult to ascertain at exactly what date irrigation should take place as the atmosphere is never excessively dry and the dew is sufficiently heavy to prevent the crops from wilting or changing color. In average years, however, regular applications should be made throughout the dry period beginning not later than July 1 without reference to showers. Approximately 1 ft. of water should be applied in

2 or 3 irrigations for most crops. The yields of potatoes at Corvallis, given in the subjoined table, were cut short by frost.

In a comparative test, near Hillsboro, of Utah alfalfa and an Arabian variety secured from the Bureau of Plant Industry of this Department, the latter made a much stronger start during the first season. After being clipped twice, it went into the winter season with a growth of 8 in., while the Utah alfalfa required the whole season to grow high enough to be clipped. An unusually severe winter completely killed the Arabian alfalfa and injured the Utah variety to some extent. The general failures of alfalfa in the Willamette Valley are attributed to lack of moisture, absence of nitrifying bacteria, and favorable soils and treatment. A crop of clover was secured the first year after sowing, an event that had not previously occurred in the community to the knowledge of any of the local farmers. A crop was also secured the third year, although without irrigation, the land usually becomes so foul with grass and weeds as to prevent this.

Cooperative experiments near Albany gave results from a soil in poor physical and chemical condition resulting from inadequate drainage and long continued shallow cultivation. At a cost of approximately $20 per acre 60 acres were tile drained. On land of this character, irrigation seems unlikely to be beneficial to clover unless the crop is in sufficiently good growing condition to resist the baking that is likely to result. All cultivated crops were irrigated July 30, 1908, with approximately 6 in. of water.

The author discusses the feasibility of irrigation in western Oregon and the part that it will play in the development of the region. The yields secured with and without irrigation at the various points are stated in the following table:

Summary of results from irrigation experiments in Willamette Valley, 1907–1909.

Crop.	Location.	Date of irrigation	Amount of irrigation.	Yield per acre — Unirrigated	Yield per acre — Irrigated.	Increase after irrigation.
						Per cent.
Corn	Corvallis	June 29–July 29, 1907.	([a])	5,647 lbs	7,000 lbs 9,666 lbs	24.0 71.0
Potatoes	do		([a])	2,604 lbs	6,760 lbs [b]7,500 lbs	160.0 [b]180.0
Corn	do	August 1, 1908	([a])	7,280 lbs	9,640 lbs	32.4
Potatoes	do	do	([a])	3,626 lbs	5,041 lbs	39.0
Beets	do	do	([a])	2,725 lbs	4,309 lbs	58.1
Clover	do	July 23, 1908	([a])	5.07 tons	6.46 tons	27.4
Corn (thick planted.	do	July 22, 1909	0.65 ft	11,125 lbs	14,158 lbs	28.0
Corn (thin planted)	do	do	do	11,000 lbs	11,896 lbs	8.0
Potatoes	do	July 23, 1909	.54 ft	150 bu	215 bu	43.0
Sweet corn	do	July 22, 1909	.65 ft	7,000 lbs 10,[illegible] lbs	13,750 lbs 10,726 lbs	96.0 2.0
Clover	do	July 24, 1909	.69 ft		1,333 lbs	
Corn	Hillsboro	August 9, 1908	.67 ft		8,000 lbs	
Kale	do	do	do		30 tons	
Beets	do	do	do		12 tons	
Clover	do	July 14–Sept. 1, 1908.	1 ft	3.[illegible]0 tons	7.03 tons	
Corn	do	August 2, 1909	4 in		12,600 lbs	
Potatoes	do	July 31–August 16, 1909.	6 in 4 in		244 bu	
Corn	Albany	July 30, 1908	6 in		17,000 lbs	
Pumpkins	do	do	6 in		37,500 lbs	
Potatoes	do	do	6 in		68 bu	70.0
Beans	do	June 17, 1909	6 in		625 lbs	
Pumpkins	do	July 18–August 4, 1909.	6 in		10 tons	
Potatoes	do	June 19–August 6, 1909.	6 in		159 bu	
Squash	do	June 23–August 7, 1909.	6 in		12 tons	
Hops	Corvallis	August 1, 1908	6 in	750 lbs	1,500 lbs	100
Onions	Philomath	June 20–July 26, 1907.	42 in	10,567 lbs	25,700 lbs	

[a] Not stated. [b] Two irrigations.

The use of windmills in irrigation in the semiarid west, P. E. Fuller (*U. S. Dept. Agr., Farmers' Bul. 394, pp. 44, figs. 15*).—This publication, which was prepared for the purpose of assisting settlers in developing and utilizing wind power for irrigation on the Great Plains, deals with sources of water supply, the sinking of wells, the construction and operation of windmills and pumps, the storage and use of the water on different crops, and gives data regarding the use of windmills in western Kansas and Nebraska, eastern Colorado, and near Stockton, California.

It is stated that "windmills are used quite extensively for this purpose already, and there is a wide field for extending their use. The data given for plants on the Great Plains show, however, that the windmill is not a cheap source of power, and that it will not, as is so often claimed, run without attention. A windmill should be looked after as carefully as any other piece of machinery, and if this is done it will provide power for the irrigation of considerable areas at an expense which will be justified by the crops grown."

[Drainage investigations], W. H. Day (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 35 (1909), pp. 55-59*).—Previously noted from another source (E. S. R., 22, p. 589).

Building poultry houses, J. E. Rice and C. A. Rogers (*New York Cornell Sta. Bul. 274, pp. 81-124, figs. 35*).—Part 1 of this bulletin discusses the principles essential for locating and constructing economical, convenient, comfortable, and sanitary poultry houses. Part 2 is devoted to the application of these principles. Plans, details of construction, and estimates of cost of materials are given for 2 shed-roof houses and one continuous house.

The estimated cost of 1 house with 2 pens each 12 by 12 ft., large enough to accommodate 72 fowls in all, is $1.61 per fowl. The cost of the other with pens 16 by 16 ft. and accommodating 128 fowls is $1.46 per fowl. The continuous house, which is 20 ft. wide and 110 ft. long, is divided into 5 pens, each 20 ft. square, and one feed room 10 by 20 ft. Exclusive of the feed room the cost of the continuous house is 94 cts. per fowl, or $1.03 per fowl including the cost of the feed room. In all cases 4 sq. ft. is allowed per fowl.

RURAL ECONOMICS.

The factors of agricultural wealth production in Uruguay, A. Backhaus and J. Macchiavello (*Rev. Inst. Agron. Montevideo, 1909, Nos. 5, pp. 9-55; 6, pp. 71-117*).—This is a detailed account, with statistics, of land areas, character of soils, size of holdings, land values, number of owners, interest rates, exports and imports, rainfall, temperature, agricultural labor, farm machinery, rural dwellings, labor conditions, agricultural wages, and other features bearing on the economic life of the rural population of Uruguay.

Natural conditions are said to be highly favorable for great wealth production, but the lack and poor quality of agricultural laborers are the chief obstacles to economic progress. Various suggestions are made for improving present conditions, including better systems of primary education, the establishment of agricultural schools, the use of more agricultural machinery, the erection of more comfortable dwellings for farm laborers, the encouragement of land owning among laborers, the regular payment of wages, and the encouragement of all forms of agricultural cooperation, but the cutting up of large holdings and the establishment of colonization schemes are particularly emphasized as the best means for improving the conditions.

A general discussion of agriculture in the Belgian loess region, especially in the Haspengouw, C. K. van Daalen (*Verslag. en Meded. Dir. Landb., Dept. Landb., Nijv. en Handel, 1910, No. 1, pp. 69-101, map 1*).—General observations

are given on the soil and agriculture of the region called Haspengouw, in the east central part of Belgium, the agricultural population, tillage, and cattle raising.

The agricultural value of Manchuria, M. Roselli (*Agr. Colon.* [*Italy*], *4* (*1910*), *No. 2, pp. 98–121, fig. 1*).—This article describes the extent, population, climate, river and railroad systems, and agricultural products of Manchuria, and discusses the commerce of the country and its future development. While immigration of foreign farmers into Manchuria is regarded as of doubtful promise on account of land tenure and other conditions, it is believed that capable farm managers and experts could so direct Chinese labor and capital in this vast and fertile territory as to make it one of the richest agricultural wealth-producing regions in the world.

The centers of agricultural production in Ohio, L. H. Goddard (*Ohio Sta. Circ. 100, pp. 15, figs. 14*).—This circular shows by means of shaded maps the portions of Ohio most prominent in supplying each of the principal farm products. The purpose in presenting the data is to facilitate the planning of trips of inspection and investigation for farmers who wish to study methods used in the production of particular crops.

Alfalfa is grown chiefly in the southwestern portion of the State, potatoes in the northeastern portion, clover seed in the west half of the State, wool in the east central portion, apples in the northeastern quarter, oats in the northern half, corn, milch cows, and butter are quite uniformly abundant throughout the State. Ensilage corn and cheese are most largely produced in the northeastern corner of the State and tobacco in Darke, Preble, Montgomery, and Miami counties. Wheat is a considerable crop except in the southern tier of counties and in the 2 eastern tiers, while maple sirup is produced most largely in Geauga and Portage counties.

Farm life conditions in the South, E. C. Branson (*Athens, Ga., 1910, pp. 15*).—A discussion of the growth of farm tenancy and the establishment of large land holdings by industrial corporations in the South, and a plea that the small farmer be urged to become the owner of land while it is still cheap.

Origin and condition of the agricultural laborer in Livonia, A. Agthe (*Ztschr. Gesam. Staatswiss., 1909, Erganzungsh. 29, pp. XII+158*).—This volume gives a history of the agrarian labor problem in Livonia and neighboring parts of North Russia, with a discussion of the origin and present status of the farm laborer. An extensive bibliography is included.

The establishment of laborers on the land in North Germany, F. Mendelson and A. Blume (*Arb. Deut. Landw. Gesell., 1909, No. 149, pp. XVIII+847, figs. 31*).—A digest of data relating to the means that have been employed in the different provinces of North Germany during recent years for encouraging farm laborers to remain on the land.

Means of counteracting contract-breaking by agricultural laborers, W. Asmis (*Illus. Landw. Ztg., 30* (*1910*), *No. 21, pp. 196, 197*).—Attention is called in this article to the recent efforts made in different parts of Germany to diminish, by legal enactments and regulations, contract-breaking on the part of agricultural laborers and domestics. Notwithstanding these measures, the cases have become so numerous, not only on large farms but also and to an even greater extent on small farms, that the author regards it as one of the most important problems with which German agriculture is confronted at the present time.

The means that have been employed for preventing the breaking of contracts and improving agricultural labor conditions are then discussed with reference to (1) the right of inflicting punishment, (2) civil rights, and (3) police regulations. The author's conclusions under each point of view are summarized as

follows: (1) To hold fast to the present regulated penalties until some more efficacious means are suggested and to refrain from enlarging or making more severe the present criminal forms of punishment for contract-breaking; (2) to attempt to realize the present right of damages by so regulating the bondman's obligations and the amount of back wages that the burden shall rest on the new employer of the contract-breaking laborer; (3) a general introduction of workmen's record books, together with a prohibition of employing or assisting laborers without a thorough examination into the earlier work relations as shown by this book.

Agricultural contracts and the condition of the peasants in Upper Milan (*Bul. Agr. [Milan], 44 (1910), No. 17, p. 1*).—This is a summarized account of the salient features of a book by A. Serpieri, professor of rural economy in the agricultural school of Milan, dealing with the economic and social conditions of farm laborers in that province.

The investigations were made by the professor in person, assisted by some of his students, on 114 proprietary holdings and 206 colonies during the years 1904–1906, inclusive. The inquiries related not only to the labor and rent agreements as practiced, but also to the intellectual and moral condition of the peasants, their mutual aid and assurance societies, cooperative organizations, and their standard of living. The remedies suggested for improving conditions are many and take into consideration the long-standing and various customs which prevail in different parts of the province. The investigations are regarded as the most thorough yet made on the economic and social life of the peasant classes in Italy.

Small holdings in Surrey, G. H. Grellier (*Jour. Bd. Agr. [London], 17 (1910), No. 1, pp. 9–15*).—This article discusses the small holdings in Surrey, which consist largely of dairy, market-gardening, and mixed farms ranging from 5 to 50 acres in extent, with illustrations of successful cases and of the organization and operation of the Small Holdings Association at Newdigate, which purchased a non-profitable farm of 367 acres and divided it up into small holdings ranging from 1 to 30 acres.

"The general results of the undertaking seem to be (1) that some thirty or forty proprietors have taken the place of one farmer, who could not work the land at a profit; (2) that the new owners are, on the whole, healthy, and fairly prosperous; (3) that the shareholders may expect to receive back their capital intact, and have a surplus to spend on the estate in road-making or other improvements."

State aid to agriculture in Switzerland (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1910), No. 3, pp. 499–506*).—The phases of government aid briefly discussed are agricultural instruction, experiment stations, live stock breeding, soil improvement, protection against agricultural risks, encouragement of agricultural societies and associations, agricultural exhibits, and the organization of statistics.

Reports on the work of the International Agricultural Institute, E. Faina and L. Dop (*Jour. Bd. Agr. [London], 17 (1910), No. 1, Sup., pp. 47*).—The report by Count Faina, president of the institute, read at the general assembly in December, 1909, summarizes the results obtained during the year in the organization and work of the different divisions of the institute. The report by L. Dop has been noted from another source (E. S. R., 22, p. 396).

Cooperation, E. V. Wilcox (*Hawaii Forester and Agr., 7 (1910), No. 3, pp. 82–97*).—This article calls attention to the growing demand for home-grown agricultural produce in Hawaii and to the advantages to farmers of cooperation in producing and marketing sweet potatoes, limes, eggs, beans, pineapples,

rice, citrus fruits, coffee, cotton, bananas, rubber, tobacco, beef, mutton, and poultry.

Annual report on the working of cooperative credit societies in the Bombay Presidency (including Sind), for the year July 1, 1908, to June 30, 1909, C. S. CAMPBELL ET AL. (*Ann. Rpt. Work. Coop. Credit Soc. Bombay Pres., 1908–9, pp. 51+3, map 1*).—The agricultural cooperative societies numbered 120 with 7,046 members on June 30, 1909, as compared with 99 and 5,150, respectively, for the preceding year.

The inundations and the local mutual agricultural credit banks, J. CURÉ (*Rev. Hort.* [*Paris*], *82* (*1910*), *No. 6, pp. 140–142*).—This article presents a brief history of government aid to agricultural credit in France. It gives directions for organizing local mutual credit banks, and emphasizes the importance of the latter in carrying out the terms of the law of 1910, which provided for the extension of credit on long-time loans to victims of the inundations in France, who desired to rebuild or repair their homes and continue the cultivation of their small holdings. The terms under which loans could be secured and the method of repayment prescribed are summarized.

Concerning the profitableness of agriculture, A. ARNSTADT (*Illus. Landw. Ztg., 30* (*1910*), *No. 36, pp. 345, 346*).—This article discusses the question of the profitableness of agriculture in Germany in relation to the high cost of living. Statistics from 1875 to 1907 derived from reliable sources are presented to show that the gross returns to farmers are no larger now than fomerly and that, consequently, the high cost of living is not the result of high prices secured by farmers for their crops.

Advance in farm products, R. SMOOT (*Cong. Rec., 45* (*1910*), *No. 138, pp. 7174–7177*).—Statistics on the average prices of staple farm produce in 1896 and 1910, and on the purchasing power of such products as measured in terms of other products, are presented and discussed with a view of showing the improved economic condition of American farmers at the present time.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 12* (*1910*), *No. 6, pp. 41–48, fig. 1*).—Notes and statistics are given on the condition of crops in the United States and foreign countries and on the farm values and range of prices of agricultural products in the United States.

AGRICULTURAL EDUCATION.

Ninth annual general report of the Department of Agriculture and Technical Instruction for Ireland (*Dept. Agr. and Tech. Instr., Ireland, Ann. Gen. Rpt., 9* (*1908–9*), *p. VI+475*).—A report on the department's administration, funds, and work during 1908–9, including agricultural and technical instruction, and following in general the lines reported in previous years (E. S. R., 21, p. 593).

There was an increase in the number of itinerant instructors in agriculture, horticulture, bee keeping, poultry keeping, butter making, rural domestic economy, and other subjects, and an increased attendance at the winter agricultural classes, the schools of rural domestic economy, and the summer courses for teachers held in July and August at various institutions.

Agriculture for high schools, G. F. WARREN (*Proc. Ann. Conf. Agr. Sci., Amherst, Mass., 2* (*1909*), *pp. 32–43*).—The author presents an argument to show the economic value of agricultural study, based on an investigation at Cornell University of the increased earning power of trained as compared with untrained farmers on farms of the same invested capital. He holds that the place for the untrained worker is in the city factory under supervision rather than in undertaking the management of farms. The importance of trained

teachers of agriculture and of distinct courses rather than incidental teaching of the subject is strongly emphasized. He favors such courses in the public high schools and suggests a working plan for high schools having courses of three and four years.

Elementary agriculture as a subject of study in the grades, W. R. HART (*Proc. Ann. Conf. Agr. Sci., Amherst, Mass., 2 (1909), pp. 14–23*).—The author bases the educational value of elementary school agriculture on the demand which it necessarily creates for knowledge of facts and principles from the special sciences, mathematics, and other subjects of study. These advantages and others in agricultural study he sums up as consisting of "its concreteness, its immediateness, its appeal to motives both present and remote, its power to vitalize facts from other sciences by giving them utility and application, its large use in its initial stages of qualitative elements as opposed to quantitative, its universality as a source of material and motive for the application of the formal studies of reading, writing, language, arithmetic, and geography, and its unexampled appeal to the self-hood of the individual to become an independent, self-sustaining, self-reliant unit in the social cosmos, and its esthetic and moral uplift to the soul working in the midst of universal and beneficent laws."

Relationship of the physical sciences to agriculture, S. B. HASKELL (*Proc. Ann. Conf. Agr. Sci., Amherst, Mass., 2 (1909), pp. 44–49*).—This article is a discussion of the indebtedness of agricultural science and practice to chemistry under the leadership of Liebig and to the laws of physics as demonstrated in King's experiments.

Biological sciences in their relation to agricultural science, E. D. SANDERSON (*Proc. Ann. Conf. Agr. Sci., Amherst, Mass., 2 (1909), pp. 50–58*).—An explanation of the dependence of successful agriculture on entomology, bacteriology, physiology, and zoology, with some suggestions on the teaching of these subjects so as to give the agricultural student a "biological attitude" toward his study.

Nature study and agriculture in rural schools, M. A. BIGELOW (*Proc. Ann. Conf. Agr. Sci., Amherst, Mass., 2 (1909), pp. 5–13*).—The writer sees no conflict between nature study and school agriculture, but doubts the advisability of substituting the latter for the former in the seventh and eighth grades, on the ground (1) that the scientific principles common to both studies are of more worth than specialized information at that age, and (2) that esthetic appreciation of country life is preferable to commercialized interest. He suggests the term agricultural nature study as indicating the best conception of what should be taught.

Some connections between school studies and the home and industrial activities, HANNAH P. WATERMAN (*Proc. Ann. Conf. Agr. Sci., Amherst, Mass., 2 (1909), pp. 24–31*).—A description of the introduction and development of elementary agricultural and industrial work and its results in the Briggsville Training Department of the State Normal School at North Adams, Mass. Some of these results are summarized as (1) a growing respect for school and personal property, (2) a greater economy in the use of materials, (3) increased ingenuity in the use of tools, (4) increased appreciation of the value of learning by experience, (5) a greater respect for the work of parents and better ability to criticise their own work, (6) increased self-respect and charity for the opinions of others, (7) more rapid advancement in the regular work of the school, and (8) a better understanding of and sympathy with school work on the part of the community.

NOTES.

California University and Station.—J. I. Thompson, a 1910 graduate of the Iowa College, has been appointed instructor in animal industry with headquarters at Davis, succeeding F. D. Hawk, who has been transferred to Berkeley. J. S. Rose, assistant in the cereal laboratory, has resigned to accept a commercial position in Cuba.

Connecticut State Station.—The reconstructed laboratory building was formally opened August 10 at a gathering of about 400 farmers. An address was made by Director W. H. Jordan, of the New York State Station, on The Relation of the Stations to Research Work, and a memorial tablet was unveiled, bearing the following inscription: "In memory of Samuel William Johnson, who for more than fifty years served the agriculture of this State and Nation as a teacher, author, and investigator. Largely through his labors the first agricultural experiment station was established in Connecticut. Director of this station from 1877 to 1900."

Delaware College and Station.—The new dairy barn, for which the last legislature made an appropriation, is nearly completed. This barn has accommodations for 75 head of cattle and has many modern features of construction.

Maryland Station.—Roy H. Waite, field assistant in biology at the Rhode Island Station, has been appointed associate poultryman, vice C. L. Opperman, whose resignation has been previously noted.

Michigan College and Station.—The midsummer meeting of the State Millers' Association, which is cooperating with the station in a campaign for wheat improvement, was held at the college July 14. A portion of the day was devoted to an inspection of the crop-breeding plats, where work has been in progress for several years in the propagation of selected wheats. A milling plant has just been installed at the college.

J. Fred Baker, professor of forestry in the college, has been made a member of the station council. W. A. Wentworth, a recent graduate of the Iowa College, has been appointed research assistant in bacteriology in connection with investigations in soil bacteriology. Dr. Richard P. Lyman, a graduate of the Massachusetts College and the Howard School of Veterinary Science, and for several years connected with the Kansas City Veterinary College, has been appointed dean of the newly organized school of veterinary science.

Pennsylvania College and Station.—R. S. Mackintosh, formerly of the Iowa College, has been appointed assistant in horticulture to take up investigations with peaches.

Clemson College.—J. M. Napier, assistant in agronomy at the University of Wisconsin, has been appointed assistant professor of agronomy and has entered upon his duties. George G. Ainslie, assistant professor of entomology, has accepted an appointment with the Bureau of Entomology of this Department, with headquarters at Nashville, Tenn.

Wyoming Station.—Work has been begun upon the death camas, a poisonous plant which grows in the mountain valleys throughout Wyoming and other portions of the Rocky Mountain region, to determine its poisonous principles. Some interesting results have been obtained, the alkaloids having already been separated.

It is planned to add one or two new men to the station staff to devote their time exclusively to work under the Adams Act.

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EXPERIMENT STATION RECORD.

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Three years ago a brief account was given in these pages[a] of the life and work of Dr. Charles Anthony Goessmann, for nearly forty years professor of chemistry at the Massachusetts Agricultural College, the first director and chemist of the Massachusetts Station, and one of the foremost pioneers in agricultural investigation in this country. This review was prepared on the occasion of his retirement from active service at the age of eighty years. It is now a sad duty to record his death, which occurred September 1, at his home in Amherst, Mass., in his eighty-fourth year. Thus closed a life of remarkable activity, full of honor to himself and of service to the cause of agricultural experimentation.

Although a German by birth and retaining a strong affection for his mother country, Doctor Goessmann was an American in spirit and had given to this country the best years of his life, dating back to 1857. The product of his activity is not measured in monetary terms, for the value of a movement which looks to the development of an industry on a more intelligent and secure basis is beyond such measure. It is found rather in a changed public attitude which appropriates thousands for experimentation where hundreds were hesitatingly given before, in an unconscious change of practice the real origin of which is rarely known, and in the lives and activities of a band of students who received from him their first encouragement and inspiration, their standards and conception of values, and an outlook which has in large measure furnished the basis of their success. He taught the will to know, and by his teaching and the example of his work he opened up a field which was virgin and full of unseen possibilities. His own high ideals of thoroughness and accuracy and the spirit of investigation were impressed upon those who came under his teaching.

Doctor Goessmann was a man of rare personal charm and lovable character. In class room or laboratory, in the meetings of the college faculty or on the lecture platform, he was always the same gentle, patient, and considerate personality, charitable and tolerant to all men and broad and sympathetic in his views. His kindly personal

[a] E. S. R., 18, pp. 1101–1104.

interest in his students in promoting their studies and his solicitude for their success will remain with them a grateful memory. Modest and without ostentation in all that he did, he was content to let his work justify itself by its merits. He sought no other reward; and his devotion to his study prevented his turning aside into commercial channels which would have yielded him far greater pecuniary return. Thoroughness and a determination to get at the truth, untrammeled by bias or other considerations, were the guiding principles that characterized his work. He was slow to arrive at conclusions or to generalize broadly, a trait which marked him as conservative in judgment and lent stability and confidence to his deductions.

At the last commencement of the college which he had served with such distinction an excellent portrait of him was presented to the institution by the alumni, the occasion bringing together a large delegation of his former students and admirers. His health at that time prevented his being present to receive the tokens of affection and appreciation showered upon him. His work and his influence were fittingly set forth by various speakers, and these were correlated with the period to which they belong to show the courage and self-reliance and prophetic zeal called for in the beginnings of agricultural experimentation in this country. The fundamental and pioneer character of his service led to the suggestion as a fitting inscription for his monument the simple words, "Goessmann, Foundation Builder."

The fourth session of the Graduate School of Agriculture was held at the Iowa State College, Ames, Iowa, July 4–29. The enrollment was larger than at any previous session, and the interest manifested by the students has never been surpassed.

The general plan of organization was the same as heretofore. The Association of American Agricultural Colleges and Experiment Stations, through its standing committee on graduate study, was in general charge of the school. Many of the colleges represented in the association contributed to its support. The Iowa State College, through its president and trustees, generously became responsible for its maintenance. The division of agriculture of this institution, through Dean Curtiss and other members of the faculty, made the local arrangements for the session and otherwise contributed in many ways to its success. The lectures and seminars were for the most part held in the spacious and well-equipped Agricultural Hall; and other buildings, libraries, live stock, and other equipment of the college were placed at the disposal of the school. Dr. A. C. True, Director of the Office of Experiment Stations, served as dean, as at the previous sessions, and Prof. W. H. Pew, of the Iowa State College, acted as registrar.

The total enrollment of students at the close of the session was 205, three of whom were members of the negro race and three were women. Twelve other women were registered in the Graduate School of Home Economics, which was held at the college July 6-20, and was conducted in close affiliation with the Graduate School of Agriculture. In 1908 the number of students was 144 men and 19 women. This year the students came from 39 States and the District of Columbia, in addition to three students from Canada, and one each from Scotland, Cuba, Denmark, Russia, and the Transvaal.

The public opening exercises of the school were held on the evening of July 6 in the college auditorium and were attended by 700 persons from the college community, the town of Ames, and other parts of Iowa, as well as by the members of the graduate school. An address of welcome was made by Dean C. F. Curtiss on behalf of the Iowa State College. President W. O. Thompson, of Ohio State University, chairman of the executive committee of the Association of American Agricultural Colleges and Experiment Stations, responded on behalf of the association, giving an interesting account of the inception of the school and urging the importance of maintaining it on a high plane.

Dr. H. P. Armsby, of Pennsylvania State College, chairman of the committee on graduate study, discussed the need and importance of systematic graduate study as a part of the preparation of teachers and investigators in agriculture, and pointed out that the true mission of this national graduate school of agriculture was to stimulate our college and station workers to seek a broader and deeper training and to lead the way for the establishment of regular graduate courses in agriculture in our best agricultural colleges. He also urged that these colleges should lay great stress on the preparation of teachers and investigators, since they must be the chief source from which these workers on behalf of agricultural progress would come.

Dean True, of the graduate school, gave a brief history of the enterprise, and stated that among the more specific aims of the school are the following:

"(1) To stimulate more thorough study in the several branches of agricultural science.

"(2) To promote more systematic attention to problems of agricultural education.

"(3) To emphasize the vital importance to agricultural progress of the honest and rigid ascertainment of facts and the discovery of underlying principles.

"(4) To aid the establishment on a sound basis of the profession of agricultural science and teaching and the formulation of a satisfactory code of ethics for this profession.

"(5) To bring students and teachers of agricultural science in the several States and in different countries into closer touch and sympathy.

"(6) To bring workers in the so-called fields of pure and applied science into closer and more helpful relations.

"(7) To promote the more efficient and economical use of public and private funds devoted to agricultural education and research, by holding up the fundamental importance of thorough training and the right spirit in the teacher and investigator and denouncing the substitution of political and personal motives in the management and work of our agricultural institutions, for the love of truth and devotion to public interests."

He also pointed out the great expansion of agricultural education and research in this country and the consequent increase in the openings for well-trained men in our agricultural institutions.

"But most significant is the broadening of the field of activity of agricultural experts and the realization by our agricultural leaders and institutions that a truly progressive and permanently prosperous agriculture can only be reached through the quickening of the social and moral impulses of country people, as well as their intellectual faculties, and through the general improvement of the conditions of country life.

"The new development does not in any degree minimize the importance of the work of the agricultural specialist who is delving into the problems of agricultural production. On the other hand, it should stimulate him to higher and more thorough endeavor in his investigating and teaching when he realizes how the results of his work may affect the happiness and success of multitudes of men and women who live in the open country and deal in practical ways with the problems which it is the business of the agricultural scientist to solve. The growing interest in the human problems of agriculture should put new life into the effort to solve its scientific problems."

The courses of study offered by the school covered eight main lines: Plant physiology and pathology, agronomy, horticulture, animal husbandry, poultry, dairying, rural engineering, and rural economics. The courses in the last two subjects were given for the first time. The hours were so arranged that all interested in plants could attend the course in plant physiology and a similar arrangement was made for the course in animal husbandry. Seminars as well as lectures were provided, and the programme made it possible for the student to follow several lines of work. As heretofore, special attention was given to methods of investigating and teaching.

The faculty numbered 57, in addition to 17 speakers at special conferences. It included 12 officers of the United States Department of

Agriculture, 16 members of the faculty of the Iowa State College, and 33 professors and experts from 17 other agricultural colleges and experiment stations. In addition, lecture courses and seminars were offered by Dr. D. T. Macdougal, of the Carnegie Institution, of Washington; Prof. J. S. Pray, professor of landscape architecture of Harvard University; Dr. W. E. Castle, professor of zoology of Harvard University; and Dr. C. W. Gay, professor of animal husbandry of the University of Pennsylvania. The international relations of the school were brought out by the very interesting and valuable lectures given by Dr. E. von Tschermak, professor of plant breeding in the Royal Imperial College of Agriculture of Vienna, Austria; Dr. J. C. Ewart, professor of natural history of the University of Edinburgh, Scotland; and Prof. G. E. Day, professor of animal husbandry of the Ontario Agricultural College, Guelph, Canada.

The more general interest of the session naturally centered in the courses in plant physiology and pathology and animal husbandry. In the former, principles of plant breeding were discussed by Doctor Webber, of Cornell University; Doctor von Tschermak; Doctor Macdougal; and Doctor Stone, of the Massachusetts Agricultural College, with special reference to their own investigations in various branches of this subject. Dean Bessey, of the University of Nebraska, treated of plant eggs and sperms, embryology, and the relations of the sun and water to the growth of plants. Different problems in plant pathology were presented by Mr. Haven Metcalf, of the Bureau of Plant Industry; Doctor Stevens, of the North Carolina Agricultural College; and Doctor Pammel, of the Iowa State College. Considerable attention was given to methods of investigation and teaching.

In the course in animal husbandry Doctor Castle gave most instructive and inspiring lectures on the principles of heredity applicable to animal breeding, which were illustrated by his own researches with rodents. Doctor Ewart treated in a very clear and forceful manner a number of breeding problems to the solution of which his own investigations have notably contributed, such as transmission of acquired characters, telegony, saturation, maternal impressions, influence of environment, intercrossing, inbreeding, and prepotency. President Waters, of the Kansas State Agricultural College, discussed the factors affecting type, form, and quality of carcass, with special reference to investigations conducted under his supervision at the Missouri Experiment Station. Professor Eckles, of the University of Missouri, summarized the results of his investigations in feeding and breeding dairy cows. Doctor Armsby, of the Pennsylvania State College, gave an account of his recent investigations with the respiration calorimeter on the maintenance requirements of farm animals, in continuation of work presented at former sessions of the school. Mr. E. W. Morse, of this Office, gave two lectures embodying special

studies he has made on the history of cattle. Types and breeds of different classes of animals were treated by several lecturers with numerous lantern-slide illustrations.

A large variety of living animals, mainly belonging to the Iowa State College, were also exhibited and discussed in the seminars given in connection with this course. In this way beef cattle were discussed by Dean Curtiss and Professor Dinsmore, of the Iowa College; horses by Professor Kennedy, of the Iowa College, and Doctor Gay, of the University of Pennsylvania; sheep by Dean Skinner, of Purdue University, and Professor Wentworth, of the Iowa College, and swine by Professor Day, of the Ontario Agricultural College. In these and other courses given at this session of the school there was an unusually thorough treatment of scientific and practical matters. Much of the work was of the best type of university grade, and in general it was truly appropriate to a graduate school.

A course in rural engineering was given for the first time in the history of the school. Courses of lectures on irrigation were given by Doctor Fortier, of this Office; on drainage by Mr. Elliott, of this Office; on water supply, drainage, and ventilation of farm buildings by Professor King, formerly of the University of Wisconsin; on power and machinery for farms by Professor Davidson, of the Iowa College, and on the Iowa silo by Mr. King, of the Iowa College. Methods of teaching agricultural engineering were also discussed.

One of the most important enterprises of this session of the graduate school was the course in rural economics and sociology. The broadening of public interest in the more general problems of country life is leading the agricultural colleges to more active efforts to establish adequate courses of instruction in farm management and rural economics and sociology and to institute definite investigations along these lines. In their present formative stage these matters are of interest to all connected with our agricultural colleges and experiment stations. It was therefore thought best to undertake at this session of the school a general discussion of the field of teaching and investigation in these lines. The result proved the wisdom of establishing such a course. It was largely attended, and great interest was evoked by the lecturers.

Doctor Taylor, of the University of Wisconsin, opened the course with a discussion of the scope of agricultural economics and the methods used in studying this subject. Afterwards he presented the economic status of the American farmer and the issue between the farmer and the middleman.

Doctor Hibbard, of the Iowa College, followed with a quite definite treatment of agricultural cooperation and illustrated various phases of the present cooperative movement by reference to the Grange and to cooperative credit companies, grain elevators, and associations of

fruit growers and cotton and meat producers. President Butterfield, of the Massachusetts Agricultural College, outlined the field of rural sociology, showed the place of this subject in college courses and how such courses may be developed, and urged the importance of country-life investigations and a campaign for rural progress. Professor Spillman, of the Bureau of Plant Industry, told of the development of investigations in farm management in this Department and in the colleges and stations, and pointed out the scope of farm management as a subject of investigation and instruction.

The rapid progress being made in the outlining of the scope of the general subjects included in this course was definitely brought out through the lectures and discussions. Since the hearers at this course represented institutions in many States it is believed such a presentation of these subjects at the graduate school will do much to aid the more definite establishment of work in these lines in colleges in various parts of the country. This belief is strengthened by the fact that those interested in farm-management investigations and teaching formed an association to be known as the American Farm Management Association, with W. J. Spillman, president; D. H. Otis, vice-president, and G. F. Warren, secretary-treasurer.

Another new and highly successful feature of this session was a series of conferences on extension work. This work is rapidly developing in our agricultural colleges, but there is as yet little consensus of opinion regarding its field of operation and methods of organization and procedure. It was therefore thought best to have a broad survey of the field from different points of view. By such a presentation of the present status of the movement, together with some discussion of many unsettled problems, it was hoped to pave the way for a more definite and rational consideration of the subject in the agricultural colleges generally.

The discussion was opened by the presentation of the scope and organization of university extension work in general by Doctor Reber, director of the extension work of the University of Wisconsin. President Sparks, of the Pennsylvania State College, formerly in charge of extension work in the University of Chicago, continued the discussion of this theme and in particular brought out and answered some of the objections to extension work as undertaken by the universities. At the second conference Professor Hamilton, of this Office, outlined the present status of extension work in agriculture in the United States and European countries as regards financial support, organization, and methods and kind of work.

The sphere of agricultural extension work was the theme of the third conference. The discussion under this head was led by President Soule, of the College of Agriculture of the University of

Georgia, and Dean Price, of the College of Agriculture of Ohio State University. It was thus made apparent that the extension work of the agricultural colleges falls under two general heads: (1) The giving of information to adult farmers and their families which can be immediately applied to practice on their farms and in their homes, and (2) a campaign for the improvement of rural schools, including information and training of teachers in elementary and secondary schools along agricultural lines.

The fourth conference was devoted to some of the problems of agricultural extension work, as presented by President Butterfield and Professor Miller, superintendent of extension work in the Kansas College. Finally, attention was given at the fifth conference to (1) organization, by Dean Burnett, of the College of Agriculture of the University of Nebraska; (2) equipment and methods, by Professor Christie, superintendent of agricultural extension work at Purdue University; and (3) the qualifications of extension teachers, by Dean Hunt, of the Pennsylvania State College.

Meanwhile, under the direction of Professor Holden, superintendent of agricultural extension work of the Iowa State College, several meetings of extension workers and others had taken place in which the methods of equipment used by that college were quite fully displayed and discussed. The large amounts of charts, apparatus, and illustrative material assembled by the Iowa College for this work was a revelation to many. Afterwards a round table of extension workers helped to bring together some of the valuable results of the conferences. A meeting of extension directors and workers was also held for the discussion of administrative questions.

This was by far the largest and most important assemblage of persons directly connected with the extension work of our agricultural colleges. The vital relation of the proper development of this branch of agricultural education to the general success of the colleges was clearly brought out. There was also a much more definite realization of the tremendous extent and importance of the extension movement in its relations to the permanent success of American agriculture and the welfare of our rural people. It is believed that all who attended these meetings will return to their work with a deeper sense of their responsibility for the use of their best endeavors to promote this cause. It is very gratifying to know that a number of our agricultural colleges are already making strong and serious efforts to organize and maintain extension work in a substantial way. The progress recently made in this direction is very encouraging.

Secondary education in agriculture occupied a new and important place in this session of the graduate school. There was a relatively large attendance of men engaged in agricultural instruction in the special agricultural schools, public high schools, and normal schools

in different parts of the country. One formal conference on secondary agricultural education was held at which Professor Warren, of Cornell University, discussed where and how to teach agriculture. Mr. D. J. Crosby, of this Office, gave a review of the present status of agriculture in secondary schools, and Professor Davis, of Miami University, Ohio, discussed the training of teachers of agriculture. A number of more informal conferences were also held at which the work in secondary education in agriculture in different States was described and questions relating to organization, courses of study, equipment, and methods of teaching were earnestly discussed.

Interesting conferences were held on agricultural journalism and the relation of agricultural education to the business of farming. At the former the qualifications necessary for success in agricultural journalism were discussed by Mr. Henry Wallace, and college courses in this subject were described by Professor Marquis, of the University of Wisconsin, and Professor Gregory, of Iowa State College. At the latter Dr. William Hill, of the University of Chicago, called attention to the difficulties encountered by the agricultural colleges in devising systems of farm accounting and in training farm managers, and described two enterprises inaugurated under his direction to overcome some of these difficulties. Doctor Ewart spoke very briefly of the work of schools and boards of agriculture in Scotland and Ireland, and Mr. Crosby gave an illustrated address on the practical features of high-school instruction in agriculture.

A general excursion was given to Odebolt, Iowa, where the party was met by farmers and other citizens with about 30 automobiles, and thus were enabled to visit a number of large estates within a range of 40 miles where different forms of management of large cropping areas were illustrated. A general view of Iowa agriculture was also obtained en route under most favorable conditions, and the generous hospitality of the people of this region was amply demonstrated. The members of the school interested in agronomy also visited a fine farm largely devoted to the growing of seed grains near Marshalltown, Iowa. Smaller parties of botanists and others made excursions to various points in the vicinity of Ames. The International Association of Poultry Instructors and Investigators held a meeting beginning July 30.

The steady rise of interest in the graduate school since its first session and the growing attendance are sure indications that it is filling a useful place in our scheme of agricultural education. The attendance and interest might be considerably increased if all our agricultural colleges and secondary schools would regularly arrange for the attendance of at least a portion of their faculties at each session. It is believed that none of these institutions can afford to neglect to make such provision.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Handbook of biochemical methods, edited by E. ABDERHALDEN (*Handbuch der Biochemischen Arbeitsmethoden. Berlin and Vienna, 1910, vols. 1, pp. XI+698+XIII–XXVII, figs. 585; 2, pp. XXVIII+1101, figs. 53*).—This is a description of the more important methods employed in biochemistry. Volume 1 deals principally with general laboratory technics, physico-chemical methods, and general chemical methods. Volume 2 confines itself to special methods, among which are the following: Determination of alcohols, aldehydes, and acids, carbohydrates, fats, the high molecule alcohols, phosphatids, proteins, both animal and vegetable, the products of hydrolysis, etc. See also a previous note (E. S. R., 22, p. 9).

Recent work in biological chemistry, C. L. ALSBERG (*Jour. Amer. Chem. Soc., 32 (1910), No. 5, pp. 704–722*).—A review of the more important work during the last few years.

General chemistry of the enzyms, H. EULER (*Ergeb. Physiol., 9 (1910), pp. 241–333*).—A discussion of the chemical dynamics of enzym reactions.

Intracellular enzyms, H. M. VERNON (*Ergeb. Physiol., 9 (1910), pp. 138–240*).—A discussion of the various endoenzyms and methods for their extraction.

Investigations in regard to the amylase of raw and malted cereals, T. CHRZASZCZ and S. PIEROZEK (*Ztschr. Spiritusindus., 32 (1909), Nos. 45, p. 520; 46, pp. 535, 536, 539; 47, p. 544; 48, pp. 556, 557; 49, pp. 569, 571; 50, pp. 578, 579; 33 (1910), Nos. 7, pp. 66, 67; 8, p. 81; 9, pp. 98, 99; 12, pp. 132, 133, 136; 13, pp. 145, 146, fig. 1; Wchnschr. Brau., 27 (1910), Nos. 7, pp. 69–73; 8, pp. 89–91; 9, pp. 98, 99; 10, p. 120; 11, pp. 126–129; 12, pp. 134–136; 13, pp. 151–153; 15, p. 175; 16, pp. 186–188; 17, pp. 199, 200, fig. 1*).—The results of these studies show that the optimum starch liquefying temperature of the amylase in both raw and malted cereals lies between 60 and 65° C. This was also found to be the case with the amylase contained in potatoes, horseradish, beets, and human saliva. Saccharification and starch liquefication were found to go hand in hand, and at the higher temperatures it was impossible to separate the saccharifying power from the liquefying power. The optimum temperature for saccharification was found to be between 50 and 55°, and at temperatures of 65° upward its action was found to depreciate. The greater saccharification was found to take place during the first hour and at the lower limits of temperature.

It was evident that no ground exists for the belief that the raw cereal enzym acts more intensively at a lower temperature than that of malted cereals. The raw cereal extracts differed among themselves in their range of activity, wheat and rye being more active than barley, and the weakest action being observed with oats and millet.

From this work it is concluded that the distinguishing terms for the diastases, "translocation" and "secretion," evidently do not hold good.

The starch liquefying capacity of the malt extracts was greater than that of the raw cereals, in all probability because the amylase exists in the raw cereals in the proenzym state.

Part 2 confines itself chiefly to a study of methods for determining the starch liquefying capacity, and the results indicate that Lintner and Sollied's method is the best for the purpose.

The effect of alcohol on invertase, C. S. HUDSON and H. S. PAINE (*U. S. Dept. Agr., Bur. Chem. Circ. 58, pp. 8, figs. 2*).—In these investigations, "O'Sullivan and Thompson's observation that alcohol reduces the activity of invertase is confirmed, and the relation between alcoholic strength and inactivation is shown to be graphically a rounded curve. Alcohol is found to destroy invertase, and the relation between alcoholic strength and rate of destruction is very peculiar, as it shows a high maximum at about 50 per cent alcohol. The destruction follows the course of unimolecular reactions; it is not noticeable below 20 per cent alcohol at 30° C., is almost instantaneous at 50 per cent, and decreases to nearly zero at 80 per cent. If the alcohol contains cane sugar, the destruction is much slower; thus, 6 per cent cane sugar reduces the rate of destruction in 50 per cent alcohol from 0.850 to 0.009, or to about 1 per cent of its original value. A mathematical theory of the progress of the inversion of cane sugar by invertase in alcoholic solutions of sufficient strength to slowly destroy the enzym has been worked out and its conclusions found to agree with the results of the experiments. In this way it has been possible to measure the activity of invertase in 50 and 70 per cent alcohol, where the destruction plays an important rôle. Invertase can be precipitated by alcohol without much destruction, provided the strength of alcohol in the final solution is high, approximately 90 per cent. By this method of precipitation, working at room temperature, a solid preparation was obtained which had 78 per cent of the activity of the original solution If cane sugar is present, invertase can be precipitated with no important destruction by even 70 per cent alcohol; this method of precipitation gave a recovery of 94 and 96 per cent of the original activity."

The destruction of the enzym invertase by acids, alkalis, and hot water, C. S. HUDSON and H. S. PAINE (*U. S. Dept. Agr., Bur. Chem. Circ. 59, pp. 5, figs. 2*).—Measurements were made according to the method previously described (E. S. R., 23, p. 110) to determine the rate of destruction of invertase by hot water, alkalis, and acids, and at different temperatures.

From the results it is seen that as the temperature is raised the rate of destruction by acids and alkalis increases until finally at or about the temperature of 60° C. distilled water itself slowly destroys invertase, and at 65° destruction by water is quite rapid. It is thus evident that the destruction of invertase by hot water is due to the same cause as its destruction by acids and alkalis. As far as is known this is the first evidence offered to explain the cause of the well known destruction of enzyms by hot water. It explains why dry enzym preparations can be heated without destruction to temperatures over 100°, in case no water is present, since the hydrolysis does not then take place.

In studying the influence of temperature in increasing the rates of destruction, and comparing the rates of destruction in the same medium at different temperatures, the coefficient which shows how many fold the rate increases for 10° in temperature is found to be on the average 3.1. This agrees with the general observation that this factor for most chemical reactions varies between 2 and 4. The hydrolytic destruction of invertase by acids, alkalis, and hot water thus falls in with the common types of chemical reactions.

The results on the work of the protective action of fructose against the destruction of invertase indicate "that the enzym forms a combination with

the sugar which is more resistant to the destructive action of acids, alkalis, hot water, and alcohol than is invertase itself."

A theory of the influence of acids and alkalis on the activity of invertase, C. S. HUDSON (*U. S. Dept. Agr., Bur. Chem. Circ. 60, pp. 3, fig. 1*).—Invertase acts best in a weak acid solution, the enzymotic power decreasing with the increase in acidity. In an akaline media it is inactive. A simple explanation of this fact, according to the author, is "that acids and alkalis combine with invertase by the principles of the law of mass-action and prevent it from inverting cane sugar." This hypothesis is tested mathematically and comparisons are given between the results actually found and those calculated.

The influence of nutrients on diastase formation, K. SAITO (*Wchnschr. Brau., 27 (1910), No. 16, pp. 181–183*).—The results of experiments with *Aspergillus oryzæ* and inorganic and organic nitrogenous bodies show that these bodies are contributing factors to the formation of diastase.

On the behavior of cellobiose with some enzyms, E. FISCHER and G. ZEMPLEN (*Liebig's Ann. Chem., 372 (1910), No. 2, pp. 254–256; abs. in Chem. Ztg., 34 (1910), No. 54, Repert., p. 205*).—The authors show on the basis of new researches that no hydrolysis of cellobiose which could be detected with phenylhydrazin took place when subjecting this carbohydrate, according to the old method, to the action of aqueous extracts of *Aspergillus niger*. By changing the method of cultivating the *A. niger* and lengthening the time of exposure, a strong cleavage of the disaccharid was brought about.

A new theory of alcoholic fermentation, R. KUSSEROW (*Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 6–7, pp. 184–187; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 1, p. 27*).—Yeast by virtue of its requirement for oxygen splits a part of the sugar molecule into a diatomic alcohol which is not stable and which is transformed into ethyl alcohol, carbon dioxid, and nascent hydrogen. The nascent hydrogen in turn reduces other molecules of sugar to the diatomic alcohol, and this process is repeated successively.

On the proteid substances of barley. II, Transformation of the proteid matters during malting and malt storing, H. SCHJERNING (*Compt. Rend. Lab. Carlsberg, 8 (1910), No. 2, pp. 169–395, figs. 2*).—This is a continuation of the work with barley, previously noted (E. S. R., 18, p. 165).

During the germinating process it is shown that "the insoluble proteid matters existing in the barley grain are partially converted, through one or several intermediate stages, into a water-soluble proteid which shows the same reaction as Albumin II. This proteid is further converted, in whole or in part, into another, which has the same reaction as Albumin I, and which is finally split, entirely or partially, by the proteolytic enzyms, thus giving rise to peptic (denuclein, proteoses and peptones) and tryptic decomposition products (ammonia, amin-amid compounds). Hordein is first partially converted into hynin (insoluble in water), which by further action is converted, as a whole or partially, into a water-soluble albumin, which has the same reaction as Albumin II. This albumin is transformed in the manner described above. Edestin is converted, in whole or in part, into dynedestin (Albumin II), which is, wholly or partially, further converted as mentioned above. The edestin salts are, in general, transformed entirely into leucosin. Leucosin—whether preexisting in the barley or arising from the edestin salts—seems to be very resistant toward the action of proteolytic enzyms. As a rule, it is not affected by these, at any rate not to any appreciable extent. The albumin (Y- or leucosin?) formed, whose reaction is the same as that of Albumin I, is, on the contrary, very readily acted upon by proteolytic enzyms.

"The proteid conversion taking place in germinating barley is brought about by three processes, namely, the albumin dissolution process, proteolysis, and the

albumin transformation process. When the proteid conversion has been normal and completed, we shall always find the albumin dissolution process to be equal to the proteolysis, while the total amount of edestin salts preexisting in the barley has at the same time been transformed into leucosin. The malt does not contain Albumin II at all. The proteid conversion takes place by the selfsame rules, whether the barley malted be six-rowed or two-rowed. . . .

"[In regard to the] germination temperature, the optimum temperature of a normal and finished proteid conversion may be described as an optimum zone extending from about 13 to about 17° C. If the germination is effected at a temperature between 17 and 20°, the quantitative aspect of proteid conversion is impaired, while the qualitative aspect is not affected. If germination be effected at a temperature above 20°, the result will be abnormal and incompleted proteid conversion. Among all the transformation processes, that of albumin dissolution is the one which is the most sensitive to the action of temperature. The optimum of acid-formation lies at about 16°. The velocity of development of the acrospire increases with the temperature of germination. A falling off in the germination temperature extending beyond the minimum limit of the optimum temperature zone (about 13°) tends to weaken the root-growth to a marked degree. . .

"[In reference to] time, the largest amount of decomposition and transformation is accomplished during the first four days of germination, both as regards carbohydrates and proteid matters. The velocity of reaction is affected by temperature. Over-germination causes some of the forces operating in normal germination to suspend their activity entirely or partially (peptic action, root-growth, and physiological oxidation process), while others even commence operating in an opposite direction, that is, become reciprocal (transformation of carbohydrates and albumins [transformation of Albumin II into Albumin I]); only two transformations continue in the same manner and the same direction as they did when the germination was normal (tryptic action and acid formation).

"[For the] conditions of moisture, abnormal conditions of moisture during germination tend to impair the transformation of carbohydrates, the root growth, the oxidation process and the albumin transformation process. The oxidation process is weakened more by too dry a germination than is the root growth, whereas both processes are equally impaired when the germination is conducted under excess of moisture. A particularly dry germination appears to impair the proteolysis also ([but] only the peptic, not the tryptic action).

"Barley contains both peroxidases and real catalases. The amount (or action) of peroxidases increases in the process of germination, but decreases in kiln-drying. The amount of catalases, on the other hand, does not increase while the barley is germinating; but it declines during the kiln-drying process. Peroxidases occur in the periphery of the barley-corn and in the germ, but not in the endosperm. In the rootlet peroxidases occur in large quantities, while the leaflet is altogether free from these enzyms.

"[During the] storage of malt no noticeable loss by oxidation takes place. Both the acidity and the amount of soluble mineral constituents increase in the course of storage. From this fact it may be inferred that the quantity of soluble phosphates (primary) becomes greater during storage. The yield in extract increases somewhat with the time of storage. Peptic action increases a little during storage. During a moist period of storage Albumin I shows a tendency to be transformed into Albumin II; the reverse process takes place in a dry storing period."

The ratio of methyl pentosans to pentosans in certain seeds, G. BORGHESANI (*Jour. Landw., 58 (1910), No. 1, pp. 77-79*).—The average ratios of

methyl pentosans to pentosans in certain varieties of corn and soy beans, as determined according to the method of Tollens and Ellett, were for soy beans 6.18 and for corn 5.4.

In regard to castor seeds (ricinus) in peanut flour residues, F. Schmidt (*Ztschr. Öffentl. Chem., 16 (1910), No. 6, pp. 101–123*).—A polemical article in reference to the toxicity of ricinus in peanut refuse flour for farm stock.

Contributions to our knowledge of the chemistry of fruits for the year 1909, A. Olig, E. Brust, and H. Stumpf (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 10, pp. 558–569*).—The authors draw attention to the fact that Baier and Neumann (E. S. R., 19, p. 210), in proposing the ratios of sugar-free extract to matter insoluble in water and of insoluble matter to alkalinity for determining the nature of the fruit employed in the manufacture of marmalades, neglected to make a previous examination of the fruits themselves for purposes of comparison. The authors have, therefore, examined strawberries, currants, raspberries, gooseberries, cherries, prunes, plums (various varieties), peaches, apricots, apples, and pears. The stems of the berry fruits, the stones of the stone fruits, and the skins and seed casings of the pomaceous fruits were removed, and after the preliminary cleaning process the fruits were passed through a meat chopping machine and examined.

The results obtained agree fairly well with the specifications announced by Baier and Neumann, except in the case of strawberries, which yielded the constants set down for pomaceous seed fruits. Currants and raspberries were the closest related in regard to their constants of all the fruits. On the other hand, both of these differed from the strawberry in their content of insoluble matter and in the Neumann-Baier ratios, and differed from gooseberries in insoluble matter and alkalinity. All berries, with the exception of the strawberry, had higher Neumann-Baier ratios than either the stone or pomaceous seed fruits, the stone fruits in addition being higher in ash, phosphoric acid, and alkalinity of water soluble matter. Stone fruits differ from pomaceous seed fruits in that they have a higher ash, alkalinity, and Neumann-Baier ratio. Very little difference exists between peaches, prunes, and plums, while one variety of plum (Reineclaude) and apricots differ from the other stone fruits in that they have a higher sugar-free extract and ash content and a higher alkalinity.

Chemical organization of a typical fruit, A. E. Vinson (*Jour. Biol. Chem., 7 (1910), No. 6, pp. XL, XLI*).—It is shown that unripe dates of the invert sugar type retained their high cane sugar content as long as the fruit remained intact, this probably being due to the presence of intracellular invertase which is only liberated by traumatism of the fruit and thereby coming in contact with the cane sugar. Filtered juice of the date was found to contain very little or no invertase, this remaining in the pulp. See also a previous note (E. S. R., 22, p. 709).

The sugar of the grape, L. Roos and E. Hugues (*Ann. Falsif., 3 (1910), No. 19, pp. 202–204*).—Numerous varieties of grapes were examined for their glucose, levulose, and acid content.

The maxima of the first series, which included the Concord, Télégraph, 130–4 Malègue, Elvira, Isabelle, 13–317 Castel, Noah, Rupestris, Riparia X Rupestris, Jacquez, Clinton, Riparia, Taylor, and Othello varieties, were 151 gm. glucose per liter of must, was 151 gm., and 153 gm. levulose. The minima were, respectively, 61.61 and 66.90 gm. The maximum glucose-levulose ratio was 1 : 1.05 and the minimum was 1 : 0.87.

For the second series, which included Petit-Bouschet, Aspiran-Bouschet, Piquepoul-Bouschet, Cissaut-Bouschet, Piquepoul Gris, Alicante-Bouschet, Aspiran Noir, Grand Noir de la Calmette, Morastel-Bouschet, Clairette, Carignan,

Terret-Bourret, Grenache, and Aramon, the maximum glucose content was 127.62 and the minimum 93.75 gm. per liter of must. For levulose the maximum was 125.58 and the minimum 88.65 gm. The maximum glucose-levulose ratio was 1 : 1.1 and the minimum 1 : 0.93.

About the constituents of cauliflower, R. DMOCHOWSKI and B. TOLLENS (*Jour. Landw., 58 (1910), No. 1, pp. 27–31*).—Cauliflower contains cellulose, glucose, fructose, pentosans, and methyl pentosans. While cane sugar could not be detected, it was possible to note a hydrolizable carbohydrate which may possibly be of the same nature as that noted by Tanret (E. S. R., 22, p. 112). A glucuronic acid reaction was obtained.

The constituents of red clover flowers, F. B. POWER and A. H. SALWAY (*Jour. Chem. Soc. [London], 97 (1910), No. 568, pp. 231–254*).—Red clover flowers (*Trifolium pratense*) were examined with the following results:

On treatment of an alcoholic extract of the flowers with steam an essential oil was obtained which yielded furfurol and with its constants *d* 20/20=0.9476; *a*D+4°0′ in a 1-dcm. tube.

The water-soluble substances in the alcoholic solution isolated were as follows: A sugar yielding phenylglucosazone (m.p. 205° C.), salicylic acid, *p* coumaric acid, isorhamnetin (295° C.); some new phenols—pratol, $C_{15}H_8O_2(OH).O.CH_3$ (253° C.), pratensol, $C_{17}H_9O_2(OH)_3$ (210° C.); a new glucosid—trifolin (which on hydrolysis yields a yellow coloring matter—trifolitin, and rhamnose); isotrifolin; and a glucosid of quercetin.

The portion of the alcoholic extract insoluble in water consisted chiefly of resin-like bodies and contained myricyl alcohol, heptacosane, hentriacontane, sitosterol, trifolianol, and a mixture of fatty acids which were chiefly palmitic, stearic, and linolic, with small amounts of linolenic, oleic, and isolinolenic acids.

The importance of chemical soil investigation in relation to agrogeological work and soil charting, A. VON 'SIGMOND (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 225–243, figs. 3; separate, pp. 19, figs. 3*).—The author draws attention to the importance of utilizing the results of chemical analysis for agrogeological research and for the charting of soils. Just as much stress should be laid on the chemical results as is done in petrographic research. The chemical analysis of the soil is further a measure for the activities of the soil-forming factors therein. Particular reference is made to the alkaline soils Bekes-Csaba (szik) and Cservenak (good wheat soil).

The recommendations for the determinations to be made are as follows: (1) Total water-soluble salts by the electrical conductivity method; (2) the total alkaline carbonate; (3) the total water-soluble alkaline carbonate; (4) titration of the chlorids by the ordinary methods; and (5) by difference the amount of sulphates.

Methods of field investigations of soils (szik) containing soda, A. VON 'SIGMOND (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909) pp. 247–256, figs. 3; Separate, pp. 10, figs. 3*).—Attention is called to the use of the electrical conductivity apparatus for measuring the salt content in soils and the apparatus for extracting the salts, as employed by the Bureau of Soils of this Department (E. S. R., 9, p. 535). See also a previous note (E. S. R., 13, p. 229).

The author proposes the following classifications for the total salt content of soils: First class, includes those which contain no more than 0.1 per cent; second class, those between 0.1 and 0.25 per cent; third class, those from 0.25 to 0.5 per cent; and fourth class, all soils over 0.5 per cent. Soil containing more than 0.5 per cent of salts is considered infertile.

For the actual soda content the limits set are as follows: First class, not more than 0.05 per cent; second class, 0.05 to 0.1 per cent; third class, 0.1 to 0.2 per cent; and fourth class, 0.2 per cent and over.

The modern understanding of weathering in the light of colloid chemistry, F. CORNU (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 123–130*).—The heterogeneous processes involved in weathering are briefly explained in the light of colloid chemistry.

The unification of chemical soil analysis, E. W. HILGARD (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 303–311*).—A discussion of, and a plea for, the unification of soil analysis.

Methods of chemical soil analysis, K. EMSZT (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 219–223*).—A description of the official methods of the Association of Official Agricultural Chemists.

Methods of soil analysis of the Royal Prussian Geological "Landesanstalt," F. SCHUCHT (*Compt. Rend. Conf. Internat. Agrogéol. [Budapest], 1 (1909), pp. 189–192*).—A description of methods.

Accuracy in taking and preparing mixed fertilizer samples, F. B. PORTER (*Jour. Indus. and Engin. Chem., 2 (1910), No. 4, pp. 148–153, figs. 2*).—The author shows that much inaccuracy exists in the present methods of sampling and preparing fertilizers for analysis, and that this ultimately results in discrepancies which are much greater than those usually obtained in the laboratory under normal conditions.

[Determination of ammonia by aeration], P. A. KOBER (*Jour. Amer. Chem. Soc., 32 (1910), No. 5, pp. 689–691*).—It is stated that no ground exists for the assertion of Grindley and Gill (E. S. R., 22, p. 303), that where relatively large amounts of phosphorus and magnesium are present there is a retention of ammonia. The error lies in the fact that too little alkali is used in liberating the ammonia.

The identification of fat from domestic animals used as food, poultry, and game, by means of examination by physical methods, G. KRAMER (*Feststellung der Untersuchungsmerkmale der Fette der Schlachttiere, des Wildes und Geflügels durch vergleichende physikalische Untersuchungen. Inaug. Diss., Univ. Giessen, 1909, pp. 76; rev. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 23, p. 890*).—As a result of his studies with the refractometer, the author concludes that by the usual physical methods it is possible to determine definitely the origin of a given fat.

About making an absolute extract estimation in barley, R. SEIBRIGER (*Wchnschr. Brau., 27 (1910), No. 27, pp. 321–323, fig. 1*).—The author describes a modified method of absolute extract estimation, utilizing an apparatus termed the "barley disintegrator."

Twenty-five gm. of the ground barley (flour) is doughed in with 100 cc. of water and 40 cc. of malt infusion (1 part malt + 4 parts water) and allowed to stand in the disintegrator until the next morning, when the mixture is brought to a temperature of 110° C. and allowed to remain at this temperature for 1 hour. The flame is then turned off, the temperature allowed to fall to 100°, and the blow-off valve carefully opened. The top of the apparatus is unscrewed, the beaker taken out and cooled to 55°, and to this is added 60 cc. of the malt diastase solution. The substance is then brought into the mashing apparatus, the temperature raised in 10 minutes to 60°, allowed to remain at this temperature for ¾ of an hour (agitating during this time), heated to 70°, allowed to stand at rest at this temperature for 15 minutes, and then stirred for ½ hour until the saccharification is complete. After cooling, the contents are made up to 225 gm. with distilled water and the specific gravity of the filtrate taken with the pycnometer.

An example for calculating the results is given.

Detection of sulphured barley and malt, J. BRAND (*Abs. in Chem. Ztg., 34 (1910), No. 61, p. 540*).—The author utilizes the usual distillation method with phosphoric acid and collects the distillate in $\frac{1}{100}$-normal iodin solution. One hundred gm. of sulphured malt required 1.2 to 3 cc. of the iodin solution, while unsulphured malts required only 0.3 to 0.4 cc.

Determination of phosphoric acid in cereals, P. CARLES (*Proc. Verb. Soc. Sci. Phys. et Nat. Bordeaux, 1908–9, pp. 2, 3*).—The method proposed is as follows: Take equal amounts of the cereal and potassium nitrate, and one-tenth the amount of sodium bicarbonate, and add in fractions in a platinum dish at a red heat. When the deflagration has ceased, allow to cool, and extract with water, dry the filter, and incinerate the residue. After dissolving the residue in dilute nitric acid, unite the two filtrates, fill up to a definite volume, and determine the phosphoric acid in aliquot portions.

A rapid method of determining crude fiber, J. M. PICKEL (*Jour. Indus. and Engin. Chem., 2 (1910), No. 6, pp. 280, 281, fig. 1*).—A modified method of digesting, filtering, and washing crude fiber. The washing and filtering is done by an upward suction through a wide-mouthed thistle tube which has at its extremity a piece of fine mesh linen (32 by 32 threads per square centimeter). Illustrations of the various stages of the process are shown. The results obtained with the method are considered good.

The determination of crude fiber, G. M. MACNIDER (*Jour. Indus. and Engin. Chem., 2 (1910), No. 6, pp. 281, 282*).—A modification of the above process.

A new quantitative method for cellulose, R. DMOCHOWSKI and B. TOLLENS (*Jour. Landw., 58 (1910), No. 1, pp. 1–20*).—This is a combination of the Henneberg crude fiber method and the nitric acid method applied to the estimation of cellulose.

Cellulose digestion in domestic animals, W. GRIMMER and A. SCHEUNERT (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 7, pp. 152, 153*).—In an article previously noted (E. S. R., 22, p. 474) attention was drawn by one of the above authors to the fact that the work reported by Lohrisch (E. S. R., 21, p. 265) was based on an error due to defective methods of cellulose determination. This article presents the results of an investigation of the method employed by Lohrisch and shows that the cellulose is attacked to quite a degree by the potassium hydroxid and hydrogen peroxid employed.

Apparatus for the estimation of cellulose, A. GRÉGOIRE and E. CARPIAUX (*Bul. Soc. Chim. Belg., 24 (1910), No. 5, pp. 217–221, fig. 1*).—A description of an apparatus for washing and filtering off the residual cellulose in cellulose estimation for feeds, etc.

Spanish paprika, A. LOWENSTEIN and W. P. DUNNE (*Jour. Indus. and Engin. Chem., 2 (1910), No. 4, pp. 139–142*).—Analytical data are reported and discussed with reference to judging the quality of paprika.

Studies of the reactions due to the colloidal state of curdled milk, F. BORDAS and TOUPLAIN (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 6, pp. 341–343*).—Curdled milk heated to 110° C. is not capable of decomposing hydrogen peroxid, nor does it give a blue coloration with paraphenylenediamin, but if the casein is brought to a finely divided state the catalytic action returns. This is not due to peroxidase but to a colloidal state of the casein.

The detection of palm fat in butter and lard and lard in butter, E. EWERS (*Milchw. Zentbl., 6 (1910), No. 4, pp. 154–171; Ztschr. Öffentl. Chem., 16 (1910), Nos. 7, pp. 131–141; 8, pp. 147–152*).—The author investigated the physical and chemical methods for this purpose, and concludes that from the distillate-magnesium number and the petroleum-ether-magnesium number it is possible to detect 10 per cent of palm fat in butter. The saponification number can be determined at the same time. In lard it is possible to detect at

least 5 per cent of palm fat with certainty with the petroleum-magnesium figure. Precipitating the soaps by barium instead of magnesium salts gives analogous results, but the process is more complicated. Determining the middle molecular weights of the fatty acids split off from the barium soaps and the nonvolatile soluble fatty acids according to Jackenack will not detect as little as 15 per cent of lard in butter. Determining the solution temperature will not detect 15 per cent of palm fat in butter or lard, or 15 per cent of lard in butter fat.

Detection of cocoa oil in butter and lard, FENDLER (*Ztschr. Öffentl. Chem., 16 (1910), No. 8, pp. 152–166, figs. 2*).—Two methods are described for the detection of cocoa fat in butter and lard.

One is based on the fact that the ethyl esters of the fatty acids obtained from cocoa fat have a boiling point different from those contained in either butter or lard. The other is based upon the solubility of these fatty acids in a 60 per cent (volume) alcohol, and in which fats or oils the fatty acids of which contain more than 16 atoms of carbon are only slightly soluble.

A new method for estimating tartaric acid, A. KLING (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 10, pp. 616–618*).—To 25 cc. of a solution containing 3 to 4 gm. per liter of right-handed rotary tartaric acid add 100 cc. of water, 25 cc. of dilute sodium potassium tartrate solution (16 gm. per liter left-handed rotation), and 20 cc. of calcium acetate solution (30 gm. per liter). Collect the precipitate obtained on a filter, wash, and redissolve in 20 cc. of hydrochloric acid solution (40 gm. per liter). Make up the solution to 150 cc., add 40 cc. of sodium acetate (10 per cent) and calcium acetate (1 per cent), and bring the mixture to the boiling point. Cool, collect the racemate on a filter, wash with water, redissolve in sulphuric acid solution (10:100), bring to the boiling point, and titrate with potassium permanganate (about 16 gm. per liter). The permanganate titer is determined with pure potassium bitartrate.

Maize products, and maize starch and its products, W. P. KAUFMANN (*Jour. Soc. Chem. Indus., 29 (1910), No. 9 pp. 527–531*).—A general description of the processes utilized for separating and producing the various maize products.

[Cold storage of asparagus for canning purposes] (*Pure Products, 6 (1910), No. 6, pp. 312, 313*).—Canners often find it necessary to store asparagus for future canning, and tests were conducted to determine how long asparagus will keep fresh at a temperature of 4° C. From the results it is concluded that no appreciable change takes place after storing for a period of 4 weeks.

The preparation and storage of tomato and apple pulps, F. F. HASBROUCK (*Pure Products, 6 (1910), No. 7, pp. 378–381*).—A popular discussion.

Table mustard, A. HASTERLIK (*Der Tafelsenf. Vienna and Leipsic, 1910, pp. VIII+165, pls. 3, figs. 56*).—This is a technical work on the utilization of the mustard plant, with particular reference to the fabrication of table mustard.

The manufacture of starch, alcohol, and sugar, S. ASTON (*Agr. Gaz. [Tasmania], 18 (1910), No. 5, pp. 99–102*).—In this article a detailed statement is given in regard to the cost of manufacture of starch and alcohol from potatoes and of the manufacture of beet sugar, with an estimated cost of the machinery therefor in different parts of the world but with particular reference to Tasmania.

METEOROLOGY—WATER.

Handbook of climatology, J. HANN (*Handbuch der Klimatologie. Stuttgart, 1910, vol. 2, pt. 1, 3. ed., pp. XII+426, figs. 7; rev. in Bot. Ztg., 2. Abt., 67 (1909), No. 23–24, pp. 325–326; Science, n. ser., 31 (1910), No. 791, pp. 305, 306; Nature [London], 83 (1910), No. 2120, p. 457*).—This is the first part of the

second volume of the third revised and enlarged edition of the Handbook of Climatology (E. S. R., 20, p. 1013) and deals with climate of the Tropics.

The introductory chapter discusses the general character of tropical climate. A special section deals with physiological action on the human organism, particularly that of the white man, noting advances in tropical medicine. There is taken up in succession the climate of West Africa and the Congo, East Africa and the Sudan, the monsoonal area of Asia and North Australia, the Pacific islands, and tropical America.

Bulletin of the Mount Weather Observatory (*U. S. Dept. Agr., Bul. Mount Weather Observ., 2 (1910), pt. 6, pp. 347–410, figs. 8, charts 6; 3 (1910), pt. 1, pp. 1–68, pls. 2, figs. 3, charts 6*).—These numbers contain the following articles:

Vol. 2, pt. 6.—The Upper Atmosphere, by J. H. Jeans; The Changes of the Wind with Altitude (illus.), by A. J. Henry; Note on the Interpretation of Laine's Rainbow Observations, by W. J. Humphreys; and Upper Air Data for October, November, and December, 1909 (illus.), by W. R. Blair.

Vol. 3, pt. 1.—Some Effects of Heavy Pressure on Arc Spectra (illus.), by W. J. Humphreys; and Free Air Data for January, February, and March, 1910 (illus), by W. R. Blair.

Monthly Weather Review (*Mo. Weather Rev., 38 (1910), Nos. 4, pp. 507–668, figs. 10, charts 34; 5, pp. 669–828, figs. 6, charts 34*).—In addition to the usual climatological summaries, weather forecasts and warnings for April and May, 1910, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts, these numbers contain the following special papers:

No. 4.—The Work of the Water Resources Branch of the United States Geological Survey in the Ohio River Valley, by A. H. Horton; Ice Conditions on the Great Lakes During the Winter of 1909–10, by N. B. Conger; The Flood of July 10–20, 1909, in the lower Missouri Valley (illus.), by J. W. Smith; Cooperative Investigations of Water Supply and Its Relations to the Development of Central Oregon, by J. C. Stevens; Irrigation in the Willamette Valley, by J. H. Lewis; The Idagon Irrigation Project (illus), by E. L. Wells; and A Method for Reducing a Short-record Temperature Mean to the 33-year Normal, by F. H. Bigelow.

No. 5.—Low Waters in the Rivers of Southern Mississippi during the Spring of 1910, by F. Montgomery; Stream Flow of the Ocmulgee and Oconee Rivers in Georgia, by W. A. Mitchell; The Reclamation of Minnesota's Waste Lands, by G. A. Ralph (see p. 490); Relation of Deforestation to Precipitation and Run-off in Wisconsin (illus.), by W. C. Devereaux (see p. 443); The Work of the Weather Bureau and Its Relation to Engineering, by J. W. Smith; The Pathfinder Dam and Reservoir, Wyoming, with Reference to the Catchment Area and Its Water Supply (illus.), by L. V. Branch; Protection of Fruits from Frost, etc.; Experimental Determination of the Relation of Forests to Stream Flow, by F. H. Brandenburg (see p. 443); Complete Proving of the Roosevelt Dam, by L. N. Jesunofsky; Spiders and Anticyclonic Winds, by F. A. Carpenter; Hydrographic Data of the Sacramento River (illus.), by W. B. Clapp; and The Idaho Irrigation Project, by E. L. Wells.

Relation of the farmer to the Weather Bureau, L. A. MERRILL (*Mo. Weather Rev., 38 (1910), No. 1, pp. 119, 120*).—The value of meteorological observations for the arid farmer, fruit grower, and irrigation farmer is briefly discussed, and the establishment of more stations than are now in existence is urged.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. OSTRANDER and C. M. DAMON (*Massachusetts Sta. Met. Buls. 257, 258, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pres-

sure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during May and June, 1910. The data are briefly discussed in general notes on the weather of each month.

Evaporimeter records (*Florida Sta. Rpt. 1909, pp. XI–XIII*).—Weekly observations with 4 evaporimeters placed respectively in an open field, pine woods, on hammock soil, and near the water level in a limestone sink are reported. The period of observation extended from July 20, 1908, to June 28, 1909.

The level of the subsoil water of Cairo, A. LUCAS (*Survey Notes [Egypt], 1 (1907), No. 6, pp. 194–199; Cairo Sci. Jour., 2 (1908), No. 24, pp. 311–313; 3 (1909), No. 28, pp. 4–6; 4 (1910), No. 43, pp. 95–98*).—In studies similar to those by Ferrar on the level of the subsoil water in the Delta (E. S. R., 22, p. 616), data were obtained which led to the conclusion that there has also been a general rise in the minimum level of the subsoil water of Cairo, especially during the last 10 years. This was particularly marked in 1909.

Amount and composition of drainage waters, B. C. BURT and J. W. LEATHER (*Rpt. Cawnpore [India] Agr. Sta., 1909, pp. 22–26, figs. 4*).—Additional data obtained with 4 drain gages constructed in 1903 (E. S. R., 21, p. 17) are recorded.

During the year ended May 31, 1909, the rainfall was 31.53 in. In the two 6-ft. gages the percolation was 14.15 in., carrying 102.38 lbs. per acre of nitrogen as nitrates, and 13.95 in., carrying 108.29 lbs. per acre of nitrogen as nitrates, respectively. In the two 3-ft. gages the corresponding percolation was 15.2 in. and 15.72 in., carrying 64.7 lbs. and 57.23 lbs., respectively, per acre of nitrogen as nitrates.

Surface water supply of the Missouri River basin, 1907–8, R. FOLLANSBEE and J. E. STEWART (*U. S. Geol. Survey, Water-Supply Paper No. 246, pp. 311, pls. 13, figs. 2*).—This report contains the results of flow measurements in the drainage basin of the Missouri River.

Surface water supply of the Lower Mississippi River basin, 1907–8, W. B. FREEMAN, W. A. LAMB, and R. H. BOLSTER (*U. S. Geol. Survey, Water-Supply Paper No. 247, pp. 124, pls. 2, figs. 2*).—This is a report of the results of flow measurements at different points in the drainage basins of the Arkansas, Red, and Yazoo rivers, as well as at a few other places in the Lower Mississippi River drainage basin.

Surface water supply of the Great Basin, 1907–8, E. C. LA RUE and F. F. HENSHAW (*U. S. Geol. Survey, Water-Supply Paper No. 250, pp. 151, pls. 6, fig. 1*).—This is a report of flow measurements at various places in the Wasatch Mountain drainage area, the Humboldt Sink drainage basin, the Sierra Nevada drainage area, and the Great Basin drainage in Oregon.

Surface water supply of California, 1907–8, W. B. CLAPP and W. F. MARTIN (*U. S. Geol. Survey, Water-Supply Paper No. 251, pp. 363, pls. 7, fig. 1*).—This is a record of stream measurements made in cooperation with the State of California in the lower Colorado River, the Great Basin, South Pacific Ocean, San Francisco Bay, and North Pacific Ocean drainage areas. An article by W. C. Mendenhall on Fluctuations in Ground-water Levels in the Valley of Southern California is appended in continuation of work previously noted (E. S. R., 19, p. 815).

The quality of the surface waters of California, W. VAN WINKLE and F. M. EATON (*U. S. Geol. Survey, Water-Supply Paper No. 237, pp. 142, pl. 1*).—This paper gives the results of a cooperative study by the U. S. Geological Survey and the state engineer of California of "the natural waters of the State of California, their seasonal variation in composition and in physical characteristics, and the damage which they have sustained by reason of pollution."

Summarizing the results of this study it is stated that "the average mineral content of the 87 rivers studied in detail is 368 parts per million, the average in the humid regions being 165 parts and in the semiarid regions 628 parts. The bicarbonate radicle is predominant in most of the waters. Its place is taken by the sulphate radicle in the water from the regions of least rainfall. The average amount of the bicarbonate radicle, computed as normal carbonate, is 27.3 per cent of the anhydrous residue, and the amount of this constituent is never abnormally high as compared with that found in surface waters of other sections of the United States; but in the waters of the more arid regions its relative amount sinks into insignificance, averaging only 5.8 per cent in Santa Maria River. The sulphate radicle fluctuates in inverse ratio to the bicarbonate radicle. It forms 58.5 per cent of the residue of the water from Santa Maria River, and in the humid regions it is as low as 10.2 per cent in the average of Santa Ana River at Mentone in 1906. In examination of the 'spot' samples, the lowest carbonate and the highest sulphate percentages were found in the same stream, Gaviota Creek, where carbonates were only 3.1 per cent and sulphates were 60.3 per cent of the total anhydrous residue."

The quality of the surface waters of Illinois, W. D. COLLINS (*U. S. Geol. Survey, Water-Supply Paper No. 239, pp. 94, pls. 3*).—This paper, which is based upon the results of analyses of 27 samples of water, "furnishes the means of stating with fair accuracy the quality of water which may be found at any point along the larger streams within or bordering the State of Illinois. It also includes some explanation of the variations in the quality of the water at different times and places.

"The natural and economic features which determine the character of the streams are considered in a general way. The larger drainage divisions are described briefly. A short account of the distribution of population and principal industries of the State shows how these are affected by the streams and how they influence the quality of water in the streams. Methods of collecting and analyzing samples of water are described. . . . Each river is discussed in detail with reference to its source, course, discharge, and quality of water. The cities located on it are considered with reference to their use of and their effect on the water. . . . It is shown that the only large supplies of water in the State are surface waters. Nearly all the surface waters are so polluted as to be unfit for domestic use without purification. They usually contain such dissolved mineral matter and so much suspended material as to be unsuitable for many manufacturing purposes, but by proper treatment they may be rendered safe for drinking and suitable for all industrial uses."

SOILS—FERTILIZERS.

Soil conservation, W. J. SPILLMAN (*U. S. Dept. Agr., Farmers' Bul. 406, pp. 15*).—This publication sets forth the need of improved methods of farming to meet the increased demand for food. It is pointed out that the bringing into cultivation of new lands no longer meets the growing demands and that these can be met only by more intensive methods of farming. The importance of increasing the number of domestic animals and of paying more attention to the growing of leguminous and other crops which provide a supply of humus for the soil is especially emphasized. There is general need of better adaptation of types of farming to the conditions prevailing in different sections of the country and of readjustment of the farming population to these conditions.

"There is this difference between our situation and that of the older countries of Europe: Hitherto we have been exporters of our feed stuffs rich in fertilizer constituents, while they have been importers. They have been draw-

ing on the newly settled regions of the world for materials with which to feed their crops. Now that we have reached the period where we need to do the same thing, there are no great areas of virgin soil from which we can draw such supplies. Indeed, it seems that the countries of Europe will not always be able to draw on supplies of this character from other parts of the world, because they will soon be needed in the regions where they are produced. The American farmer can therefore not hope, at least in the near future, to import feeding stuffs with a view to enriching his land, but he will be making a long step forward when he quits exporting these materials and returns them to his own soil."

Agricultural geology, E. CORD (*Géologie Agricole. Paris, 1909, pp. 450, figs. 316; rev. in Jour. Soc. Cent. Agr. Belg., 57 (1909), No. 2, pp. 43, 44*).—This is one of the volumes of the Encyclopédie Agricole. It is divided into three parts, dealing respectively with land and water, the geological history of the earth, and the stratigraphy of the earth. One chapter deals particularly with the soil and surface geology.

Agrogeology, K. O. BJÖRLYKKE (*Norges Landbr. Höiskoles Skr., 1909, No. 11, pp. 56, fig. 1*).—A report of the first International Agrogeological Conference at Budapest, April 14–23, 1909. The papers relating to agrogeology have been previously noted from another source (E. S. R., 23, pp. 314, 315, 316).

The bacterial life in the soil, B. HANSTEEN (*Norsk Landmandsblad, 29 (1910), Nos. 8, pp. 101–103; 9, pp. 113–115*).—A lecture delivered at the farmers' course at the Agricultural College of Norway, January, 1910.

Bacterial activity as a corrosive influence in the soil, R. H. GAINES (*Jour. Indus. and Engin. Chem., 2 (1910), No. 4, pp. 128–130; abs. in Chem. Ztg., 34 (1910), No. 32, p. 282*).—Previously noted from another source (E. S. R., 22, p. 715).

On the "sick" soils of Porto Rico, O. LOEW (*Porto Rico Sta. Circ. 12, pp. 24*).—Studies of the chemical composition, bacteriological condition, and fertilizer requirements of certain "sick" coffee, cane, tobacco, and pinapple soils are reported.

It was found that as a rule these sick soils did not respond to ordinary fertilizing, indicating that their condition was not due to lack of fertilizing constituents. The soils showed, however, an abundance of micro-organisms which produce butyric acid. In some cases organisms which change sulphates into sulphids were also observed. Disinfection of the soil with bisulphid of carbon was an effective corrective, but is expensive. A deficiency of aeration and the presence of fermentable substances in the soil were found to present favorable conditions for the growth of facultative or strictly anaerobic micro-organisms which often produce injurious fermentations.

The action of manure on a certain Iowa soil, E. B. WATSON (*Proc. Iowa Acad. Sci., 16 (1909), pp. 103–130, pls. 6, fig. 1; Wallaces' Farmer, 35 (1910), Nos. 7, p. 274, fig. 1; 10, p. 435, fig. 1; 11, p. 484, fig. 1; 13, p. 570; 14, p. 610, fig. 1; 15, p. 651*).—Pot experiments comparing manure and fertilizer on clover on a loess soil from southern Iowa are reported. See also a previous note (E. S. R., 20, p. 742).

The experiments showed that manure was much more effective in increasing the yield of clover than were mineral fertilizers. This beneficial effect is attributed to the antitoxic effect of the manure. "There was a toxin in the soil which was neutralized by the manure. The soil pots treated with mineral fertilizers had the toxin corrected by the combined action of the clover roots and the chemicals, but this was a slower process than the action of the manure." Cockleburs which grew abundantly on the field from which the soil was obtained are considered the source of the soil toxin.

Quantitative relationships of carbon, phosphorus, and nitrogen in soils, R. STEWART (*Illinois Sta. Bul. 145, pp. 91–127*).—The literature of investigations on carbon, nitrogen, and phosphorus in soils is reviewed, and a bibliography of 82 references is given.

A study of the relationship of carbon, phosphorus, and nitrogen in certain Illinois soils, particularly that of the southern Illinois experimental farm, is reported, special attention being given to methods of determining the organic matter and associated mineral matter in the soils. The results of this study are summarized as follows:

"The phosphorus-nitrogen ratio in the surface soil of the brown silt loam soils is 1: 13.5 while the same ratio in the black clay loam soils is 1: 11.4.

"Under normal conditions the nitrogen-carbon ratio of the soil has a tendency to become narrower as the age of the organic material increases; the ratio, however, never becomes narrower or even equal to the ratio of the more common proteins contained in the humus-producing materials.

"The nitrogen-carbon ratios of the ordinary brown silt loam soils of Illinois are 1 : 12.1, 1 : 11.5 and 1 : 8.9 in the surface, subsurface, and subsoil respectively. The ratios in the black clay loam soils are 1 : 11.7, 1 : 11.9 and 1 : 9 in the surface, subsurface, and subsoil respectively.

"The phosphorus-carbon ratio in the surface soil of the brown silt loam is 1 : 165.2 while the ratio in the surface soil of the black clay loam soils is 1 : 163.6.

"The calculation method for determining organic phosphorus is very conservative in character and can be relied upon in drawing broad general conclusions.

"The evaporation on the water bath of the ammoniacal solution, in the preparation of the "matière noire" in quantity for analysis, causes a hydrolysis of the organic phosphorus compounds.

"The determination of the phosphorus associated with the precipitated "matière noire" is not a quantitative method for the determination of the total organic phosphorus of the soil. It should be regarded only as a good qualitative evidence of the existence of organic phosphorus in the soil

"The contention of Fraps that, 'There is no evidence that the phosphoric acid in the filtrate is in organic combination' and that, 'it is probably derived from the iron and aluminium phosphates' is entirely untenable."

Active phosphoric acid and its relation to the needs of the soil for phosphoric acid in pot experiments, G. S. FRAPS (*Texas Sta. Bul. 126, pp. 7–72, figs. 2, charts 4*).—The work reported in this bulletin dealt with (1) the phosphoric acid of the soil and the nature of the phosphatic compounds dissolved by weak solvents, and (2) pot experiments comparing analytical and crop results—the relation between productiveness and "active" (soluble in fifth-normal nitric acid) phosphoric acid. In the course of the work a study was made of the solubility of a number of mineral phosphates which may occur in soils, including various calcium, iron, and aluminum phosphates, and of the fixation phosphates in soils.

The pot experiments were not all conducted in exactly the same manner, but the general procedure was as follows:

"Washed gravel was added in sufficient amounts to an 8-inch Wagner pot to make the total weight 2 kg. Five kg. of soil was then added The soil had been previously pulverized in a wooden box with a wooden mallet until it would pass a 3 mm. sieve, gravel being removed.

"The addition of fertilizer consisted of 2½ gm. of acid phosphate, 1 gm. nitrate of soda, and 1 gm. sulphate of potash. In later experiments 1 gm. of ammonium nitrate was used in place of nitrate of soda. If the size of the crop appeared to render it necessary, more nitrate of soda or sulphate of potash was

added to the pot. They were added in solution, . . . but if added after planting, the solution was diluted with about 200 cc. of water.

"The seed were weighed out so that each pot received the same amount of seed within 0.1 gm. Water was added to one-half the saturation capacity of the soil. If this quantity was found to be too great, it was afterwards reduced, but this was the case in only a few instances. The pots were weighed, placed on scales three times a week, and water added to restore the loss in weight. If the plants needed water between these weighings, such quantity was added as appeared necessary. The object of the weighing was to maintain as closely as possible a constant amount of water in the soil.

"A few of these experiments were conducted in a greenhouse . . . and a number were made on trucks covered with wire mosquito netting. The trucks were pulled into the house when a storm threatened. Later experiments were made in houses covered with canvas. These houses appear to be very well suited to pot experiments under our climatic conditions. They are much better for this purpose than glass houses, for the reason that the circulation of the air is considerably better and the house does not become so heated as a glass house would. Some of these experiments were carried on in houses with glass roof and canvas sides. This also appears to be a good form of house for our climatic conditions. A house with glass top and wire mosquito-netting sides is also being used. In some respects this is better than the canvas house, but in other respects it is not. The canvas houses are somewhat cooler. The open house is hotter, but the plants are of heavier growth than in the canvas house."

The author summarizes his results as follows:

"The plant food withdrawn from the soil by the plant depends upon the form of combination of the plant food, its protection or nonprotection by encrusting particles, the action of weathering agencies upon it, and the nature of the plant.

"The composition of the soil extract, by any solvent, depends upon the quantity of the phosphate exposed to the solvent, and its solubility under the conditions of the extraction, the solubility of the material which protects phosphates, and the fixing ability of the soil for phosphoric acid from the solvent in question.

"Fifth-normal nitric acid dissolves phosphates of lime completely, but dissolves such iron and aluminum phosphates as usually occur in the soil only to a slight extent. It thus distinguishes between these two classes of compounds in the soil.

"Fifth-normal nitric acid may not distinguish between phosphates which have unequal values to plants. Soils should be compared which probably contain the same kinds of phosphates.

"One per cent citric acid has a lower solvent power for mineral phosphates than fifth-normal nitric acid. The solvent power of other solvents is discussed. Fifth-normal nitric acid is preferred.

"Soils absorb phosphoric acid in solution in fifth-normal nitric acid and other solvents.

"The percentage of the added phosphoric acid absorbed by the soil increases as its content of oxids of iron and aluminum increases.

"Residues from the extraction of the soil with fifth-normal nitric acid and with stronger acids may have nearly as great absorbing power as the original soil.

"The phosphoric acid absorbed by soils is not extracted by the first extraction with fifth-normal nitric acid, but its effect is evident in the fourth, and sometimes in the sixth, extraction.

"Natural soils resemble soils which have received potassium phosphate in their behavior to fifth-normal nitric acid in successive extractions.

"Soils containing little or no phosphates of high solubility give practically the same amounts of phosphoric acid to successive extractions.

"Soils which have a fixing power of 80 per cent or less have a fixing power of about half as much from fifth-normal nitric acid solution. Soils which have a fixing power over 80 may fix equally as high a percentage from fifth-normal nitric acid.

"When the significance of the phosphoric acid extracted from a soil by fifth-normal nitric acid is to be decided, the fixing power of the soil for phosphoric acid and the acid consumed should also be known.

"Sulphite of lime increases the amount of phosphoric acid extracted from soils high in iron.

"Calcareous soils contain phosphates which are protected by the carbonate of lime from the roots of plants, but which are exposed by solution of the carbonate of lime in acid solvents.

"The amount of lime and magnesia dissolved may be estimated from the quantity of acid consumed.

"The quantity of material dissolved in second or succeeding extractions with acid is sometimes large.

"It would appear that the lime and magnesia are present in highly soluble forms (carbonates and silicates), moderately soluble silicates and silicates of low solubility.

"Citric acid dissolves less iron, lime, and magnesia than fifth-normal nitric acid.

"It would appear that the phosphoric acid dissolved by fifth-normal nitric acid in excess of about ten parts per million comes from phosphate of lime.

"Judging the amounts of phosphates of lime presented to the roots of plants in a given soil, one must allow for the decrease due to absorption, and the increase due to solution of incrusting material, so far as possible.

"The author extracts the soil with fifth-normal nitric acid without correcting for neutralization.

"It is impossible to maintain only one variable in pot experiments, though one may predominate. Soils may appear deficient for phosphoric acid and yet be highly productive without phosphatic fertilizing.

"Soils containing less than 20 parts per million of phosphoric acid extracted by fifth-normal nitric acid are highly deficient in phosphoric acid in pot experiments.

"Soils from which 20 to 100 parts per million of phosphoric acid are extracted by fifth-normal nitric acid are usually deficient for phosphoric acid in pot experiments, and the extent of their deficiency is related to the quantity of phosphoric acid present.

"Although the pot experiments were carried out under diverse conditions, the average corn crop is closely related to the quantity of active phosphoric acid in the soil.

"Soils containing from 100 to 200 parts per million of active phosphoric acid are possibly deficient in phosphoric acid in pot experiments, the chances being even that they are or are not deficient.

"The average possible corn crop, based upon the quantity of phosphoric acid extracted from the soil in pot experiments, increases regularly with the amount of active phosphoric acid extracted by fifth-normal nitric acid. Soils containing less than 10 parts per million of phosphoric acid had an average possibility of 4.5 bu. corn per acre. If they contained 10 to 20 parts, the possibility is 12.3 bu. If they contained 30 to 100 parts, the average possibility is 19.7 to 26.3 bu. corn per acre. If they contained 110 to 420 parts per million, the average possibility was 50 to 60 bu. corn per acre.

"The maximum possible corn crop also increases directly with the quantity of active phosphoric acid in the soil.

"Soils may provide sufficient phosphoric acid for large crops, and yet respond to phosphoric fertilization in pot experiments.

"Phosphoric acid is taken up by the crop which comes from other sources than the active phosphoric acid—especially if the soil contains less than 30 parts per million of active phosphoric acid.

"The phosphoric acid removed by the crop in percentages of the active phosphoric acid decreases with the quantity of active phosphoric acid in the soil."

A review of the phosphate fields of Idaho, Utah, and Wyoming, with special reference to the thickness and quality of the deposits, W. H. Waggaman (*U. S. Dept. Agr., Bur. Soils Bul. 69, pp. 48, pl. 1*).—This report is based upon investigations made in cooperation with the U. S. Geological Survey and "contains the results of work in the season of 1909 on the sampling and analyses of the phosphate rock, together with some notes on the processes of its manufacture into superphosphate and mixed fertilizers, and on the present status of the industry in general so far as the western phosphate field is concerned."

The report deals only with portions of Bear Lake County, Idaho, Uinta County, Wyo., and Rich County, Utah.

The 35 analyses reported from the main phosphate beds show percentages of phosphoric acid varying from 29.1 to 38.6. It is stated that all of the phosphate mined in this area is sent to California for fertilizer manufacture, and it is believed that "there is little prospect that the western phosphates will be extensively mined in the near future owing to the great distances to present markets."

The importance of the German potash salts for industrial and agricultural purposes, P. Krische (*Chem. Indus. [Berlin], 33 (1910), Nos. 6, pp. 157-170; 7, pp. 195-210; 8, pp. 244-255; 9, pp. 279-286*).—This article discusses the occurrence of potash in nature and the character and value of various commercial sources of potash. The results of many experiments on different kinds of plants are reviewed to show the agricultural importance and value of potash salts. Specific directions for potash manuring of different kinds of crops are given.

The relation of lime to soil improvement, E. O. Fippin (*New York Cornell Sta. Circ. 7,[a] pp. 16*).—This paper, read before the National Lime Manufacturers' Association at Pittsburg, Pa., January 27, 1910, briefly explains the physiological, biological, chemical, and physical effects of lime on soil and crop. It is shown that lime is widely needed on New York soils, and that it gives best results when used in connection with thorough drainage and methods of culture which maintain an adequate supply of humus in the soil.

The forms of combination and relative availability of different lime compounds are described and it is stated that the matter of selection of the compound used "resolves itself into the question of the form in which the largest amount of lime in the finest state of division can be gotten on the soil." Considering composition and fineness, the author concludes that "50 lbs. of lump lime is equivalent to 60 lbs. hydrated lime, 100 lbs. air-slaked lime, [or] 250 lbs. ground limestone or marl."

On the influence of the fineness of lime on its action as an amendment of peat soils low in lime, H. von Feilitzen (*Svenska Mosskulturför. Tidskr., 24 (1910), No. 2, pp. 95-98, fig. 1*).—Slaked lime and powdered limestone of differ-

[a] This circular must not be confused with the circular, also numbered by the station Circular 7, entitled An Apparatus for Measuring Acidity in Cheese Making and Butter Making, by C. A. Publow, issued in May, 1909, and previously noted (E. S. R., 21, p. 732).

ent degrees of fineness were applied to small plats of peat low in lime, with heavy potash and phosphoric acid fertilization, for barley. The slaked lime in all cases produced larger yields of kernel and straw than the powdered limestone. The yields secured in either case increased with the fineness of the lime fertilizer applied, with the exception that the next to the finest slaked lime (0.2 to 0.5 mm.) producd somewhat better results than the finest size (below 0.2 mm.).

On the composition and fertilizing value of peat ash, H. von Feilitzen (*Svenska Mosskulturför. Tidskr., 24 (1910), No. 2, pp. 101–110, figs. 3; abs. in Ztschr. Moorkultur u. Torfverwert., 8 (1910), No. 3, pp. 158, 159*).—Analyses of 9 different samples of peat ash are given. The lime content varied from 5.79 to 21.04 per cent (average for 8 samples, 13.26 per cent), the potash content from 0.52 to 2.21 per cent (average 1.16 per cent), and the total phosphoric acid from 1.73 to 2.7 per cent (average 2.3 per cent). Only a portion of the potash was soluble in acids and the water-soluble portion was very small. There was no water-soluble phosphoric acid, but about four-fifths of the phosphoric-acid content soluble in 24 per cent hydrochloric acid was citrate-soluble.

Field experiments with peat ash as a fertilizer for a well-decomposed peat soil, high in lime and nitrogen, were conducted during the seasons 1907 to 1909 on plats of 0.36 square meter area, with lupines and other legumes, the peat ash being applied at the rate of 2,000, 4,000, and 6,000 kg. per hectare (about 1,780, 3,560, and 5,340 lbs. per acre, respectively). Comparisons were made with similar quantities of citrate-soluble phosphoric acid in peat ash and in superphosphates, and of soluble potash in peat ash and 37 per cent potash salt. The results showed that the citrate-soluble phosphoric acid in the peat ash produced an increase in yield of from 50 to 60 per cent of that with the water- and citrate-soluble phosphoric acids in superphosphates, and that the acid-soluble potash in the peat ash had a value of from 30 to 50 per cent of that produced by 37 per cent potash salt.

Comparison of the fertilizing value of peat litter, straw, and wood shavings used for bedding, H. von Feilitzen (*Svenska Mosskulturfor. Tidskr., 24 (1910), No. 2, pp. 111–118, figs. 5*).—The results of the experiments conducted by the author showed that the peat litter produced decidedly better yields in the case of both potatoes and soiling crops than did either straw or shavings litter.

Fertilizers on soils used for oats, hay, and miscellaneous crops, M. Whitney (*U. S. Dept. Agr., Bur. Soils Bul. 67, pp. 73*).—This bulletin is based upon a compilation from reports and bulletins of the experiment stations of 1,483 tests of fertilizers on oats, 1,263 tests on hay, and 3,589 tests on miscellaneous farm and truck crops.

The results indicate in the case of oats and hay as in the case of other crops reported upon in this series of bulletins (E. S. R., 22, p. 23; 23, pp. 138, 139, 239) that a combination of fertilizer ingredients is more efficient than single substances and that the smaller applications of single fertilizers, manure, and commercial fertilizers were as efficient in increasing the yield as the larger applications.

Commercial fertilizers, C. E. Bradley (*Oregon Sta. Bul. 107, pp. 3–11*).—This bulletin summarizes the main provisions of the fertilizer law of Oregon, discusses the composition and valuation of fertilizers, gives statistics of fertilizer consumption in the State, and reports analyses of samples of potash salts, nitrate of soda, bone meal, tankage, dried blood, and complete fertilizers collected in the State. The figures reported indicate that the consumption of fertilizers in the State is small, amounting to only about 310 tons during the year ended June 30, 1909.

Soils and fertilizers, T. E. KEITT (*South Carolina Sta. Bul. 151, pp. 3–36*).—This bulletin describes the main soil types of South Carolina and discusses their fertilizer requirements and management. The source, composition, mixing, and use of fertilizers are also discussed.

Inspection and analyses of cotton-seed meal, season 1909–10, W. F. HAND ET AL. (*Mississippi Sta. Bul. 128, pp. 31*).—This bulletin contains analyses of 223 samples of cotton-seed meal collected by regular inspectors and received from the oil mills. The analyses show that "manufacturers have usually supplied their trade with meal equal in quality to that guarantied."

AGRICULTURAL BOTANY.

Experimental studies in the physiology of heredity (*Rpts. to Evolution Com. Roy. Soc.* [*London*], *1909, No. 5, pp. 79, pls. 3, figs. 2*).—This consists of the following papers: Further Observations upon the Inheritance of Flower Color in *Antirrhinum majus* and Note on the Physiological Interpretation of the Mendelian Factors for Color in Plants, by Miss M. Wheldale; Hybridization Experiments with *Mirabilis jalapa*, by Dorothea C. E. Marryat; and Inheritance of Color and of Supernumerary Mammæ in Guinea Pigs, with a Note on the Occurrence of a Dwarf Form, by Igerna B. J. Sollas.

Physiologically arid habitats and drought resistance in plants, A. DACHNOWSKI (*Bot. Gaz., 49* (*1910*), *No. 5, pp. 325–339*).—In previous publications (E. S. R., 20, p. 738; 22, p. 22) the author has shown the physiological effect of bog water and bog soil, from which it appears that the toxicity of the habitat exerts a marked influence in determining the character and distribution of plants. In the present paper he gives an account of additional studies on the effect of the habitat on drought resistance, basing his studies on the conditions previously noted.

It was found that in the bog habitat the ratio between the amounts of water absorbed and transpired is never constant, varying most during the growing season, but it must always be more than unity if the plants are to survive periods of extreme physiological drought during the summer and autumn months.

In considering the limiting environmental factors, it is stated that structural differences do not play much part in enabling plants to exist in bog conditions, but the conclusion is reached that the real determining factor in the bog habitat is the ratio of the possible rate of water absorption to the rate of transpiration, and that the toxicity of the bog habitat exerts a primary rôle in bringing about bog conditions.

As a possible application of the investigations it is shown that the toxicity of the habitat is not the same for all agricultural plants and forest trees, and from the standpoint of economic importance it is believed that certain species are better adapted to withstand the effects of this type of soil than others. This offers an opportunity for studies to increase the utility of these soils.

The green parts of plants and light, T. LÖHR (*Naturw. Wchnschr., 25* (*1910*), *No. 14, pp. 209–214*).—A critical review is given of recent contributions to the subject of the relationship of light to the green parts of plants, with particular attention to the perception of light as described by Haberlandt.

The coloration of red grapes and the autumn coloration of leaves, J. LABORDE (*Proc. Verb. Soc. Sci. Phys. et Nat. Bordeaux, 1908–9, pp. 14–17*).—In a previous publication (E. S. R., 20, p. 758) the author has shown that certain tannins acted upon by dilute hydrochloric acid give a reddish coloring material, and an explanation of this has been sought.

Investigations were made of the changes produced by the action of hydrochloric acid and formalin on tannin, and it was shown that these substances readily changed the color of the solution to red or reddish violet. It is claimed that tannins are widely distributed in plants and that from them, through the action of diastase, red coloring matters of a tannoid nature are formed.

The respiration of plants, F. CZAPEK (*Ergeb. Physiol., 9 (1910), pp. 587–613*).—This is a critical review of some of the more important literature relating to the respiration of plants, the author setting forth the various theories and opinions regarding this vital function. A bibliography of more than 100 publications is given.

The formation of ammonia in plant tissues deprived of oxygen, M. MOLLIARD (*Bul. Soc. Bot. France, 56 (1909), No. 6, pp. 332–334; abs. in Bot. Centbl., 113 (1910), No. 10, p. 254*).—In the course of investigations on the alcoholic fermentation of plant tissues in aseptic media, the author observed, while working with fragments of squashes, that as the liberation of carbon dioxid gradually ceased a certain amount of the gas disappeared, seeming to be fixed as a base in the tissues of the plants. The change of the reaction in these tissues together with the positive results furnished by the use of Nessler's reagent showed that there was a production of ammonia during the experiment.

The formation of ammonia is attributed to the presence of a diastase which had been previously formed in the squash and had remained active for a long time. This phenomenon is believed to be comparable to that observed in cultures of different species of Fusarium, where under certain conditions a red pigment is developed which colors the mycelium, passing into a blue coloration when the reaction of the liquid changes and ammonia is formed.

The ammoniacal fermentation observed in these two cases is believed to be a process in the death of the plant tissues, and confirms the views of Pflüger, who has claimed that at the death of the cell the cyanogen radical of albuminoid material in the plant is changed to an ammonia radical.

On nitrogen fixation in soils with cellulose as a source of energy, A. KOCH (*Centbl. Bakt. [etc.], 2. Abt., 27 (1910), No. 1–3, pp. 1–7*).—This is a continuation of studies on the fixation of free nitrogen in the soil by certain micro-organisms (E. S. R., 22, p. 428), in which the use of cellulose as a source of energy for the nitrogen-fixing bacteria is being investigated.

Vessels containing 400 gm. of soil to which 12 gm. of cellulose in the form of pulped filter paper had been added were infected with cellulose bacteria from four different sources, viz, ordinary soil, compost, stable manure, and sewer slime, respectively. The experiments extended over a period of six months, beginning with the first of August and terminating the first of the following February, a soil moisture content of 25 per cent being uniformly maintained in each vessel throughout the entire time.

The soil infected with the stable manure bacteria showed a greater quantity of fixed nitrogen and a smaller amount of cellulose present at the end of the experiments than any of the other infected soils. The average amount of cellulose consumed per vessel in each series during the experiment was as follows: For earth infection 1.2 gm., compost 3.85 gm., stable manure 10.35 gm., and sewer slime 1.85 gm.; while the average amount of nitrogen present in each series in milligrams per 100 gm. of dried soil was for earth infection 90.73, compost 92.05, stable manure 117.27, and sewer slime 87.15. The soil infected with stable manure bacteria also gave a greater percentage of fixed nitrogen than a like amount of soil to which 14.5 gm. of dextrose had been added.

It is claimed as a result of these experiments that the beneficial effects obtained by the addition of a small quantity of stable manure to any soil is due to the introduction by this means into the soil of the proper kind of cellulose-fermenting

bacteria which make available as a source of carbohydrate energy for nitrogen-fixing bacteria the cellulose material present in the soil.

Denitrification and nitrogen fixation in cultivated soil, F. S. MARR (*Mitt. Landw. Inst. Breslau, 5 (1910), No. 5, pp. 639–656*).—This is a report of a series of experiments in denitrification and nitrogen fixation in cultivated soils to which organic matter was added in the form of straw, straw and potassium nitrate, 2 and 8 per cent sugar solution, and 2 and 8 per cent sugar and potassium nitrate. In one series the contents of the vessels were thoroughly aerated throughout the experiments; in the other series no aeration was performed. The results were variable, some vessels showing a loss of nitrogen in the soil, while others showed a gain, indicating in the first instance that denitrification was predominant, and in the other nitrogen fixation.

Biological and chemical studies on nitroso bacteria, G. E. GAGE (*Centbl. Bakt. [etc.], 2. Abt., 27 (1910), No. 1–3, pp. 7–48, dgms. 4*).—A study was made of the activities of *Pseudomonas radicicola* as isolated from the soil and grown in symbiosis with *Trifolium pratense*, in which the results are given of a large number of experiments on the biology and chemistry of nitroso bacteria as represented by *P. radicicola.*

As a result of these experiments it is claimed that *P. radicicola* can be isolated from the soil, carried through inoculation experiments, and recovered in a pure state, and that the weakest strains of this organism may, by constantly growing on nitrogen-free media, become extremely virulent cultures capable of considerable fixation of nitrogen. Its greatest biological activities are shown when on nitrogen-free media containing maltose as a source of energy; when grown on carbohydrates containing less than 5 carbon atoms no gum is produced. In very old cultures, especially on solid media, *P. radicicola* develops a cell-like membranous structure, but which does not give the cellulose and starch reactions; when inoculated from such cultures into artificial culture solutions it may produce considerable nitrite and nitrate. Sugars as a source of energy accelerate the growth of the organism and the nitrification.

The article closes with an extensive bibliography of the literature on nitroso bacteria.

The action of Marasmius oreades on plant growth, M. MOLLIARD (*Bul. Soc. Bot. France, 57 (1910), No. 1, pp. 62–69, pl. 1, figs. 2*).—A study is reported on the action of the fungus *M. oreades* on the vegetation within the ring of the advancing fungus and along its periphery, to determine the cause of the destruction of the plants within the growing zone and the stimulating effect immediately adjacent to it.

The fungus mycelium is found to reduce greatly the water content of the soil, thus weakening the growth of other plants. Through its action on the humus of the soil the fungus increases the total nitrogen to an injurious amount in the center of the advancing band of growth of the fairy ring. The increased growth made just in advance of the rings and for a short distance within them is attributed to the slight increase in ammonia over that occurring normally, resulting in a stimulated growth.

Annual plants are found to be destroyed by advancing fairy rings, but perennials persist by means of their rhizomes, although they may be temporarily affected by the conditions attributed to the fungus.

Injury to vegetation and animal life by smelter wastes, J. K. HAYWOOD (*U. S. Dept. Agr., Bur. Chem. Bul. 113 (rev.), pp. 63, pls. 8, map 1*).—This is a revision of a previous report (E. S. R., 20, p. 28) on this subject, including a second investigation subsequently conducted at Anaconda, Mont. Practically the same conclusions are reached concerning the extent, character, and range of damage done by these wastes as in the original report.

International catalogue of scientific literature. M—Botany (*Internat. Cat. Sci. Lit.*, *7* (*1910*), *pp. VIII+986*).—This is a list of titles of botanical articles most of which appeared in the literature of 1907. It is somewhat surprising to find that only about 50 titles are given of American contributions to plant pathology and not a single title relating to the control of plant diseases.

FIELD CROPS.

Limitations in field experiments, M. A. Carleton (*Proc. Soc. Prom. Agr. Sci.*, *30* (*1909*), *pp. 55–61*).—The author discusses the difficulties of securing comparable results from different plats in the same field experiment.

The most common difficulty arises from variations in the soil of different plats. It is pointed out that in variety tests at the Ohio Station, in case every third plat is a check and the soil proves progressively more productive from one portion of the field to another, the yields of some varieties are "corrected by adding or subtracting such a fraction of the difference in yields between these checks as is indicated by their position with reference to the checks." A similar method is used at the Pennsylvania Station.

The Office of Grain Investigations of this Department has adopted the following method: "An average of the yield of all the checks is taken. Then for each variety there is added to or subtracted from its absolute yield the difference between the nearest check yield and average check yield—this difference being added if the yield of the nearest check is below the average check yield and subtracted if the reverse." If a given variety stands between 2 checks, both their yields must be considered as well as the average yield of all the checks.

If the soil is abruptly variable, but uniform within small areas, very small plats may be preferable. If the variation extends in one direction it may be overcome by lengthening the plats in that direction.

Field crops, J. M. Scott (*Florida Sta. Rpt. 1909, pp. XVIII–XXIV, figs. 2*).—Analyses from various sources are presented in parallel columns for the purpose of comparing the composition of various Florida forage crops.

Guinea grass planted April 9 and 10 by means of roots placed 2 ft. apart in rows 4 ft. apart produced a yield of 3¼ tons of field-cured hay per acre by October 14 of the same year. Ninety days after planting, Natal grass was ready to cut for hay. Two cuttings of hay aggregating 5,250 lbs. per acre in addition to 2 crops of hand-gathered seed were secured the first season. It is estimated that under favorable soil and moisture conditions a yield of from 3 to 4 tons per acre may be expected.

Among 9 varieties of corn, Rawls and Evans produced the highest yields, 19.19 and 19.01 bu. per acre, respectively. Japanese sugar cane, planted January 18 and harvested November 19, yielded 24.5 tons per acre of green material, or 16 tons of sun-cured hay. It is thought that no other forage crop will produce so large a yield of carbohydrates in Florida.

The white and common velvet beans produced 26.9 bu. and 23.3 bu. of shelled beans per acre respectively, while an acre under continuous planting produced 14.77 bu. The Lyon bean produced 32.5 bu. per acre. The stock ate these beans with greater relish than they did cotton-seed hulls. The fertilizing values of velvet bean hulls and Lyon bean hulls are estimated at $7.75 and $8.25 per ton respectively and the additional feeding value at at least half their fertilizing value.

The kudzu vine (*Pueraria thunbergiana*) is a perennial legume with large tuberous roots native to Japan and China. After the first season the vines often make a growth of 40 to 60 ft. It may be propagated by division or by seeds, but is usually grown from cuttings or layers of the vines. Should it

prove adapted to Florida conditions, it is expected to be a good soil renovator and a valuable forage crop.

Plats from which cowpeas and sorghum were harvested about the same time were plowed, harrowed, and sowed to Dwarf Essex rape. The total yields from 2 cuttings of rape grown after cowpeas was 4.4 tons, as compared with 0.96 ton after sorghum. Among 18 varieties of sweet potatoes tested for value as stock food and for commercial purposes the Red Yam, Brown Seedling, and Bunch Yam produced total yields of more than 350 bu. per acre each.

Lessons from recent crop experiments, J. G. STEWART (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 61–75, figs. 10*).—Recent experiments at the various agricultural colleges throughout the United Kingdom with wheat, barley, oats, red clover, turnips, thousand-headed kale, and potatoes are briefly summarized. It is noted that drilling wheat usually saves a bushel of seed per acre, and that applications of salt at the rate of 5 cwt. per acre shortly before seeding had no marked effect upon the stiffness of barley straw, but markedly increased the yield of both grain and straw. The Potato oat excels the best of the newer varieties in quality or palatability of straw but not in yield of meal.

Cooperative field trials, 1908–9, B. R. LARSEN (*Norges Landbr. Hoiskoles Akervekst. Aarsber., 1908–9, pp. 74+15, figs. 2*).—This is the twentieth annual report of trials conducted under the direction of the author at the Aas Agricultural College of Norway and on farms in different parts of the country. During the year 355 trials, comprising 5,988 plats, were conducted, including variety tests with cereals, root crops, hay crops, and inoculation trials with peas, lupines, and other legumes. Experiments on the influence of fall and spring pasturing on the hay crop and the comparative value of different fertilizers on grass land are also reported.

Report of the Hedemarken County Experiment Station, 1909, W. CHRISTIE (*Ber. Hedemarkens Amts Forsogsstat. Virks., 5 (1909), pp. 55, pls. 7*).—Variety tests with turnips conducted during 1906–1909, trials of farm manure and artificial fertilizers as top-dressings for meadows in northern Oesterdalen, 1908 to 1909, and investigations of the starch content of Norwegian potatoes, 1909, and of old Norwegian oat varieties in 1908–9 (noted on page 438) are reported.

Report of the substation of the Swedish Seed Association at Luleå, A. ULANDER (*Sveriges Utsadesfor. Tidskr., 20 (1910), No. 1, pp. 33–53, pls. 6*).—Trials with pure-bred strains of grasses and legumes and also of barley and oats are reported.

Annual report of the agricultural stations in Eastern Bengal and Assam for the year ending June 30, 1909 (*Ann. Rpt. Agr. Stas. East. Bengal and Assam, 1909, pp. 136, maps 4*).—At the Dacca station a test of 11 varieties of winter rice proved a failure because of dry weather, but the local varieties stood the drought better than imported varieties. Manurial experiments with this crop indicated that bone meal applied alone is more profitable than when soluble nitrogenous fertilizer was added. Sann was a failure as a green manure because it died out soon after germination. Dhaincha grew better but was only about a foot high when plowed under. Other materials tested were saltpeter, sulphate of ammonia, calcium nitrate, cotton cake, and fish manure singly and in various combinations. As only one year's data are available, definite conclusions are withheld.

At the Burirhat station 9 different classes of tobacco of numerous varieties were tested and the results, given in tabular form, include the source of seed, area planted, time of transplanting, date and method of harvesting, the fertilizers applied, and the character of the rotation in which the crop was grown. Cochin, calicut, and Jamaica ginger were tested together with the local varieties, but all were attacked by *Pythium gracile*.

At the Rajshahi station the Dacca Ganderi sugar cane produced the greatest profit, but the local Khagri variety proved resistant to disease, drought, and attacks of animals. It is a thin hard cane. The yield of cane, percentages of juice, sucrose, and invert sugar, and the glucose ratio and value of the raw sugar, cost of production, and profit are given for each of the varieties tested. Applications of 24 maunds of castor cake (1 maund = 82 lbs.) and of 6 maunds superphosphate and 2 maunds of saltpeter, in addition to 300 maunds of cow manure per acre, apparently produced greater yields of raw sugar than did the manure alone, but the increased yield was insufficient to pay for the additional fertilizer. The application of 30 lbs. of nitrogen and 5½ maunds of castor cake was followed by a greater yield of jute fiber (*Conchorus olitorius*) than the use of the same amount of nitrogen in 107 maunds of cow manure. The application of 300 maunds of jute refuse was followed by an increased yield in the pea crop of 12 maunds, 18 seers (1 seer = 2 lbs.) per acre. "Jute refuse is likely to prove a valuable manure on light soils which contain very little organic matter." A local variety excelled in yield the Mozaffarnagar in 1907–8, but was inferior in 1908–9. Plats green-manured with cowpeas and bare-fallowed plats produced practically equal results. A variety test with potatoes is reported. *Malancha capitata* produced 8 maunds, 17 seers of fiber per acre.

At the Jorhat station the Striped Mauritius produced among 7 varieties the highest yield of sugar during a 3 years' test ending in 1909. Tables present the results of these tests and of another with the 4 Barbados varieties. All the varieties were attacked by borer and red-hot, but the former was more prevalent. The variety Mag was least affected and Majhara and Samsara were most affected by the borer. Mauritius and Paunda were most affected by red-hot and Kheri the least.

At the Shillong station the Local Red and New Jersey Jerusalem artichokes produced the highest yield of 237 and 202 maunds per acre respectively, with 130 and 6 maunds of tops respectively. Tests of 3 varieties of silkworms were carried on to ascertain how far the variety of mulberry fed to the worms affects the output and quality of cocoons and the quantity of leaf required to produce a given weight of cocoons.

At the Upper Shillong station in a test of 7 varieties of potatoes the Khasi Nainital produced the highest average yield of 111 maunds, 30 seers per acre, while in a test of 5 other varieties Up-to-date produced the highest yield, 259 maunds. Spraying with Bordeaux mixture to prevent diseases of potatoes "pays heavily." An application of 10 maunds per acre of oil cake with 150 maunds of cow manure proved more profitable than cow manure and 20 maunds of oil cake. Whole potatoes and cut sets produced practically equal yields, while tubers sprouted in boxes before planting gave a lower yield than those not sprouted. "The inference is that the sprouts were knocked off or injured when the tubers were being planted."

Report of the experimental field of Upper Dnieper Agricultural Society for 1908, A. Kol (*Abs. in Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *10* (*1909*), *No. 6, pp. 897–899*).—These pages report fertilizer and variety tests with corn, sorghum, millet, beans, vetches, rye, and wheat.

From the Zapolsk Experiment Station, N. Dyakonov (*Abs. in Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *10* (*1909*), *No. 6, pp. 875–877*).—Experiments with clover and on meadows are reported.

The improvement of cereals—Patrick Shirreff's work, W. G. Smith (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22* (*1910*), *pp. 90–106*).—A brief biography of Patrick Shirreff is followed by a survey of agriculture in the Lothians before his time and of the improvement of cereals before and during his lifetime.

Recent work on the improvement of cereals is sketched, "using the work of Patrick Shirreff as a background from which to estimate progress." Frequent references to the literature of the subject are given.

Dry-land grains in the Great Basin, F. D. FARRELL (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 61, pp. 39, pls. 2*).—Conditions at the Nephi (Utah) substation are briefly summarized and the methods of conducting the experiments explained. Part of the yields reported are taken from Bulletin 100 of the Utah Station previously noted (E. S. R., 19, p. 328). A part of the work was in cooperation with the Utah Station.

During a 6-year test the winter and spring wheat varieties averaged 20.26 and 13.22 bu. per acre respectively. Of 60 varieties of winter wheat tested, Turkey wheat (G. I. No. 2998) has produced the highest yields, averaging 27.7 bu. for the period 1904–1909. The average yield of durum wheats during 6 years was 10.06 bu. per acre, and that in 1908–9, 8.84 bu., while common varieties during the same 2 years averaged 13.3 bu. per acre. Among the common varieties tested, New Zealand Spring and Mexican No. 1 yielded 18.23 and 16.8 bu. per acre respectively.

The Boswell Winter oats, a variety of local origin, proved very strong in tillering power, so that what appears to be a very poor stand until the middle of June, later appears as a crop of surprising abundance. During 1904–1909 the Black American oats averaged 28.51 bu. per acre. During 1908–9, Sixty-Day (Highmore) and Swedish Select averaged 31.27 and 28.82 bu. per acre respectively, while in 1909, Kherson yielded 19.19 bu. per acre. The Kherson and Sixty-Day varieties ripen 10 to 15 days earlier than Swedish Select, 10 days earlier than Black American, and 15 days earlier than Giant Yellow.

The California and California Prolific barleys are botanically identical and practically equal in yield, producing 22.14 and 22 bu. per acre respectively during 1904–1909. Hull-less barley averaged 13.58 bu. per acre during 1907–1909. Utah Winter barley (G. I. No. 592), obtained from a crop of about 50 bu. per acre on an adjoining farm in 1908, yielded 25.9 bu. at the substation in 1909. It grew 25 to 30 in. in height and ripened 10 days earlier than the spring barleys. During 1908–9, Black Winter emmer proved extremely hardy and drought-resistant and averaged 42.49 bu. per acre.

Spring and fall plowing for this region are compared, depth of plowing and subsoiling discussed, and the care of fallow soil, eradication of weeds, and other dry-land topics treated.

A plat cultivated throughout the summer and one left uncultivated from the time of plowing in the fall of 1908 until just before planted in October, 1909, were on May 21 approximately equal in water content, but subsequently lost from the upper 6 ft. of soil during the season 7 and 28 per cent respectively of their moisture content. The losses from the upper 2 ft. were 10 and 37 per cent respectively.

Among sowings of wheat made at 15-day intervals from August 15 to November 1 during 1905–1909, inclusive, the sowings on October 1 and 15 produced the highest average yields of 22 and 22.68 bu. per acre respectively, while the proportion of straw to grain was lowest in case of the sowings made on October 15 and November 1. A spring wheat soil harrowed the last of April and cultivated early in June with a special weeder contained 17.64 per cent of moisture to a depth of 6 ft. on June 26 and 15.31 per cent on August 12. An uncultivated plat contained 15.97 and 11.73 per cent respectively on the same dates. As a result of other experiments conducted it is thought that plowing 7 to 10 in. deep will prove profitable.

It is recommended that winter wheat be planted from September 20 to October 20, that winter and spring barley be sown at the rate of 5 pks. per acre, wheat

from 35 to 45 lbs. per acre, winter oats 6 pks. per acre, and spring oats from 4 to 5 pks. per acre, varying inversely with the dryness of the locality. About 3 in. is the most desirable depth of planting wheat if the seed bed is well prepared. If wheat is the only crop grown, alternate fallowing should be practiced, but potatoes or possibly corn may probably be substituted for fallow.

Sand lucern, Turkestan, and Utah alfalfa are being tested. From 62.5 to 300 lbs. of brome grass seed per acre have been obtained. Minnesota Amber and Red Amber sorghums in 1909 yielded 2,490 and 2,840 lbs. of dry matter per acre respectively, but Canada field peas have not yet produced a profitable yield and corn is not a dependable crop. In 1908, 12 varieties of potatoes averaged 100.4 bu. per acre. White Peerless and Irish Cobbler proved most desirable and yielded 98 and 112 bu. per acre respectively in 1909, during which year the average value of the varieties tested was about $22 per acre. Planting 8 in. deep in hills 2 ft. apart with rows 3 ft. apart proved most desirable. The average cost per acre of wheat production on dry lands as reported by 4 farmers was $5.59 per acre, the average yield reported 26.65 bu.

Suggestions to settlers on the sandy soils of the Columbia River Valley, B. Hunter and S. O. Jayne (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 60, pp. 23, figs. 2*).—This circular describes the region lying between Dalles, Oreg., and Priest Rapids, Wash., discusses its climatic and irrigation problems, and gives directions for clearing the land and raising alfalfa, fruits, truck crops, and poultry.

Experiments with windbreaks, N. Esbjerg (*Ber. Ribe Amts Landbofor. Havebr. og Husmands., 1909, pp. 3–21*).—Experiments were conducted during the season of 1909 with artificial windbreaks made of screens 160 to 200 ft. long by 4 ft. in height and with others from 7 to 8 ft. in height. They were placed toward the west and north, or on the north and south only, in the middle of the plats. To avoid shading the crops the screens were placed about 6 ft. from the outside plats.

Every test showed a positive benefit, although variations presumably due to a lack of uniformity of the soil on different plats occurred. Severe storms made the conditions favorable for the conduct of the experiments in the earlier part of the growing season. Trials with winter rye showed increases in the yield of grain varying from 16.2 to 31.4 per cent and of straw varying from 0.4 to 22.7 per cent, as an apparent result of the protection offered by the windbreaks. The root yields of ruta-bagas were increased from 6.6 to 17.1 per cent in the various trials and the top yields from 4.5 to 63.6 per cent. Mangels showed increased yields of 3.5 per cent in tops and 18.1 per cent in roots. Three trials with clovers and grasses showed gains of from 4.4 to 22.8 per cent in yield.

The author outlines experiments for the further study of natural wind-breaks of spruce, willow, elder, and other woods, and discusses numerous questions relating to wind-breaks.

The culture and storage of root crops, E. J. Delwiche (*Wisconsin Sta. Circ. Inform. 16, pp. 14, figs. 4*).—This bulletin discusses the advantages of root crops and gives directions for planting, thinning, cultivating, harvesting, and storing them. Other topics treated are cost of production and special methods for heavy clay soils.

Plants with edible tubers, H. Jumelle (*Les Plantes à Tubercules Alimentaires. Paris, 1910, pp. XIII+372+XII, figs. 35*).—This work discusses the various methods by which tubers are formed and states the different classifications of root crops proposed on the basis of the character of the starch grains present. The general botanical and economic characters of each group of plants producing edible tubers are stated, and the cultural requirements and

food value of each of the various cultivated species given with the chemical composition of the tubers of many.

Harvesting (*Dept. Agr. N. S. Wales, Farmers' Bul. 28, pp. 80, figs. 39*).—This bulletin contains information on a large number of topics connected with the harvesting, storing, and milling of grains and on hay making. A scale of points for wheat and oat hay is suggested.

Grass plats at the experiment station during the last 15 years, S. RHODIN (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 2, pp. 113–124*).—The results of plat trials with *Bromus inermis*, *Festuca arundinacea*, *F. heterophylla*, *Avena elatior*, *A. flavescens*, and *Poa serotina* were tested at the Swedish experiment station near Stockholm, conducted with a view to determining their value for pasture or hay on soils of different character, are reported and discussed.

Abacá (Manila hemp), H. T. EDWARDS and M. M. SALEEBY (*Philippine Bur. Agr., Farmers' Bul. 12, rev., pp. 39, pls. 11*).—This is a revised and enlarged edition of this publication (E. S. R., 16, p. 868).

Alfalfa, C. WILLIS and J. V. BOPP (*South Dakota Sta. Bul. 120, pp. 661–682*).—This bulletin gives full directions for obtaining and handling a stand of alfalfa in South Dakota and for harvesting. A brief report is given of each of a number of varieties tested and the history of the seeds stated.

Alfalfa, J. M. WESTGATE (*South Bend, Ind., 1910, pp. 48, figs. 12*).—A brief history of alfalfa and description of the plant are given. Various methods of seeding, cultivating, harvesting, storing, and feeding are suggested and allied topics discussed.

Chou Moellier or marrow cabbage, W. H. LAWRENCE (*Washington Sta. Bul. 95, pp. 5–15, fig. 1*).—This bulletin gives a brief history of Chou Moellier or marrow cabbage which was recently introduced from Guernsey, and gives directions for its propagation and cultivation in Washington. It is a hybrid showing many forms intermediate between marrow cabbage and thousand-headed kale. The leaves grow from 24 to 36 in. in length by 14 in. or less in width. As the lower leaves matured they were pulled and fed to chickens or dairy cows. The plant proved about equal to kohl-rabi in frost-resisting characteristics. "From the nature of the plant it is very evident that it is rich in protein and will compare very favorably with thousand-headed kale."

Cooperative variety tests of corn. Variety tests of corn at Columbia, M. F. MILLER and H. D. HUGHES (*Missouri Sta. Bul. 87, pp. 97–158, figs. 12*).—This bulletin gives a brief history and description of each of a number of varieties of corn used in cooperative tests, and reports the yield of different varieties as tested by the cooperators during each year of the period 1905–1909. For purposes of the test the State was divided into 6 districts, as follows: Section I, northwest corner; Section II, southwest corner; Section III, the Ozark region; Section IV, the southeast Missouri lowlands; Section V, the east central river counties, and Section VI, northeast Missouri. The following table shows the most important results:

Average yields of leading varieties, 1905–1909, by districts.

Variety.	I.	II.	III.	IV.[a]	V.	VI.	Entire State.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Boone County White	47.3	36.5	41.2	62.7	57.7	45.8	44.9
St. Charles White	45.9	38.1	38.7	66.2	55.9	42.1	43.7
Leaming	46.1	32.7	39.8	59.7	57.6	44.1	42.5
Reid Yellow Dent	47.7	33.8	35.4	61.7	57.5	41.4	42.5
St. Charles Yellow	....	....	35.6	61.2	58.2	41.1	41.1
Commercial White[b]	53.0	35.9	37.6	....	62.0	39.2	43.4

[a] Average for 1906. [b] Average for 1907–1909.

An expression of first, second, and third choice by the cooperators indicated that Boone County White was much the most popular, Commercial White and Reid Yellow Dent being second and third in favor.

Plantings of 2, 3, 4, and 5 stalks per hill at Columbia produced yields of $46\frac{3}{7}$, $55\frac{5}{7}$, $54\frac{2}{7}$, and 55 bu. per acre respectively. The percentage of barren stalks increased with the number of stalks per hill. Tables show the characteristics of the varieties grown at Columbia in 1908, the height of stalk and ear, general vigor, brace root development, droop of ear, weight of corn and stover per acre, number of pounds of corn from 1 lb. of stover, and the average weight of ears. Another table gives the shelling percentages for 1908–9 which range from 77.4 to 89.1, Golden Eagle standing highest. St. Charles White and Johnson County White averaged 58.12 and 50.58 bu. per acre respectively at Columbia in 1908–9.

How to grow 100 bushels of corn per acre on worn soil, W. C. Smith (*Delphi, Ind., 1910, pp. 111, pls. 4, figs. 12*).—This book suggests methods for restoring worn-out soils. It is written with special reference to vetch, alfalfa, corn, and sweet corn.

Experiments in cotton growing, A. Borzi (*Bol. R. Orto Bot. Palermo, 8 (1909), No. 4, pp. 171–188*).—The results of cultural tests of a number of varieties of cotton are given. Crosses of Abassy, Biancaville, Caravonica, Mitafifi, and Noubary cottons are reported.

A study of oat yields, T. F. Hunt (*Proc. Soc. Prom. Agr. Sci., 30 (1909), pp. 118–124*).—The average yields of oats in Pennsylvania for 5-year periods for the 25 years ended with 1906 were 28.2, 24.6, 27.4, 26.9, and 32.1 bu. per acre respectively. The estimated yields for the United States closely paralleled these variations, showing that estimated yields during the last 5-year period were greater than for any of the previous periods. Variety tests have been conducted at the Pennsylvania Station for 19 years and the average yield of all varieties was also greater the last 5 years than for any former period. The increase is relatively greater than in the case of wheat varieties, but less than in case of potatoes. It is uncertain to what extent the introduction of improved varieties is responsible for this increase.

Studies of the fertilizer experiments at the same station show that during the 25 years ended with 1906 the decrease in yield of oats is much greater than that of corn, wheat, or hay, the yield being about two-thirds of what might be expected from the results with the other crops. The experiments were conducted on plats receiving no treatment, plats receiving 48 lbs. of phosphoric acid and 100 lbs. of potash per acre, and plats receiving the same fertilizers and 24 lbs. of nitrogen in addition. Considering the total value of the 4 crops raised on these same plats in a given year as 100, it is found that on the untreated plats oats fell from 21.9 during the first period to 17.6 during the last period; on the plats treated with phosphoric acid and potash from 21.631 to 15.6; and on the third series of plats from 20.6 to 14.1.

The composition of oats and its variations, J. Hendrick (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 16–27*).—These pages present many chemical analyses comparing newly introduced and new pedigree varieties of oats with the old Scotch varieties.

The principal points of comparison are the proportion of husk to kernel, the composition of the kernel or the oatmeal yielded by the grain, and the composition of the straw. In 1901, grain of the old varieties contained 0.14 per cent more of water, 2.37 per cent more of dry kernel, 1.78 per cent more of oil, and 0.47 per cent more of albuminoids. Of 22 varieties, Sandy and Red oats were the thinnest hulled, while Storm King was the thickest, as indicated by tests during the 2 successive 2-year periods, 1901–1904. During these

4 years, the oil content of different samples ranged from 4.6 to 10.78 per cent and the albuminoids from 11.81 to 20.38 per cent. Nearly all the old varieties of a particular locality were richer in oil than any of the new ones grown there. Both albuminoid and oil content varied according to season, variety, and other circumstances. Storm King almost invariably proved richer in albuminoids than any other new variety, and usually excelled the old varieties except Sandy.

The author concludes that the grain of the old Scotch varieties is generally richer in oil than that of the new varieties, that Potato and Sandy oats are specially rich in oil, that among the new varieties New Zealand and Wide Awake are notably good in this particular, and that Newmarket, Tartar King, and Storm King are poor in oil. The old varieties are usually higher in albuminoids than the new but exceptions to this rule are more frequent. During the dull, cool seasons, the percentage of oil was usually high while fine dry seasons produced grains higher in albuminoids. This rule also had exceptions. The straw of the new varieties was of as good composition as that of the old varieties. The albuminoid content was a little higher and crude fiber content a little lower.

Some information concerning old Norwegian oat varieties, W. Christie (*Tidsskr. Norske Landbr., 16 (1909), No. 9, pp. 420–425*).—These pages give a preliminary report of the results of a test of 19 oat varieties grown at the Hedemarken Experiment Station during 1908. The seed used had been grown on farms in different parts of Norway from 15 to 20 years or more, in one case since 1788. Two types were represented, the Eastern Norway and Trondhjem type and the Western and Northern type, belonging respectively to classes 2 and 1 of Atterberg's system.[a] The main characteristics of the different varieties are briefly discussed in this paper.

The potato, E. D. Butler (*Dept. Agr. N. S. Wales, Farmers' Bul. 27, pp. 16, figs. 7*).—This publication contains information on the preparation of soil for potatoes, seed selection, varieties, and the potato moth (*Lita solanella*), and gives directions for fertilizing, planting, cultivating, and harvesting the crop, as well as preparing it for market.

Studies and observations concerning rye culture, rye improvement, and cooperative variety tests in Denmark and Germany, E. W. Ljung (*Meddel. K. Landtbr. Styr. [Sweden], 1909, No. 2 (142), pp. 35, dgms. 2*).—The author gives an account of studies and observations made (during the summer of 1908) while on a visit to Denmark and Germany.

Seedling canes on the northside, P. W. Murray (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1910), No. 3, pp. 189–191, pls. 3*).—At the Vale Royal estate, varieties D 116 and B 208 produced yields of 48.4 and 29 tons per acre respectively, or 150 and 50 per cent, respectively, greater than that produced by White Transparent. At the Hampden estate, D 625 and B 208 gave yields of 37.9 and 31.1 tons per acre, respectively, but owing to a difference in purity percentage the latter excelled the former by 1,390 lbs. of sucrose per acre. At the Long Pond estate, Seedling B 147 is the only one of many varieties sent in by boat that has survived drought and other adverse conditions. The tops from these imported roots were planted on ¾ acre, "which was cut, giving a tonnage of 45.4 at 12 months, the highest tonnage recorded on the estate, even with the use of artificial manures, being 35 tons per acre."

The author is of the opinion that even better canes for the northside may be found among the Jamaican seedlings, which are mainly produced from the seed of White Transparent crossed with the Barbados and Demerara seedlings.

[a] Landw. Vers. Stat., 39 (1891), pp. 171–204.

Cultural methods for wheat-growing in dry districts, G. L. SUTTON (*Dept. Agr. N. S. Wales, Farmers' Bul. 32, pp. 35, figs. 29*).—This is a manual of information as to wheat production under dry farming conditions.

Prizes for improved wheats (*Jour. Dept. Agr. So. Aust., 13* (*1910*), *No. 9, pp. 730–735*).—The author states the principal regulations governing prizes for new wheats or improved strains of existing varieties specially adapted to (1) south of Adelaide, (2) the Lower North, and (3) the Upper North. The milling results of each of the wheats entered in competition are given, together with tables presenting the purity of seed yield, strength of straw, and other points of interest. In two of these districts the Federation variety made the highest average yield and highest total score of points, but the judges decided that none of the wheats justified the payment of prize money.

Results of seed investigations for 1908–9, L. H. PAMMEL and CHARLOTTE M. KING (*Iowa Sta. Bul. 115, pp. 156–177, fig. 1*).—This bulletin gives summaries of the results of purity and germination tests made in 1908–9 of the seed of clovers, alfalfa, and timothy.

The germination tests were made between blotters, in sand indoors, and in the field. Seeds grown in 1906 were tested indoors in sand in April, 1907, and in the field in July, 1909. The respective results by the 2 methods were for red clover 87.5 and 20.2, mammoth clover 84.3 and 14.3, alsike clover 82.6 and 33.3, alfalfa 80 and 33.3, and white clover 76.6 and 5.3 per cent. Seed grown in 1907 was tested in the field May 1, 1908, and July 5, 1909, with these respective results: Red clover 56 and 5.7, blue grass 23 and 12, timothy 49 and 17, mammoth clover 85 and 67, alsike clover 56.5 and 59, and alfalfa 55 and 59 per cent.

A table shows the weight of seeds of different kinds and the number of seeds required to weigh 1 gm., to constitute 1 per cent of a 5 gm. sample, and to constitute 1 per cent of a 4 gm. sample. A simple method for the home analysis of seeds without the use of scales is described. Notes on the delayed vitality of weed seeds are followed by a bibliography.

Seeds of Michigan weeds, W. J. BEAL (*Michigan Sta. Bul. 260, pp. 101–182, figs. 215*).—This bulletin discusses weeds, their introduction and means of extermination, and gives descriptions and accurate illustrations of the seeds of a large number of weeds.

HORTICULTURE.

Horticulture and pomology in the vicinity of Hamburg (*Deut. Landw. Presse, 37* (*1910*), *No. 46, p. 510*).—A descriptive account of the flower, fruit, and vegetable industries in the vicinity of Hamburg.

Experiments with garden crops grown from domestic and foreign seed, 1909, G. LIND (*K. Landtbr. Akad. Handl. och Tidskr., 49* (*1910*), *No. 3, pp. 161–213, figs. 24*).—Results of these tests indicate that in many cases seedsmen do not sell varieties true to name and the culture of pure strains of domestic seed adapted to Swedish conditions is recommended, the supervision and production of this seed to be in the hands of experienced and reliable growers.

Instructions on the preparation of horticultural products for shipment to foreign countries (*Min. Int. et Agr.* [*Brussels*], *Off. Rural, Avis aux Cult., 2. ser., 1910, No. 8, pp. 42, figs. 44*).—A popular bulletin containing detailed instructions for Belgian growers relative to the packing and marketing of fruits, vegetables, and flowers.

Precooling fruit for shipment, C. M. GAY (*Ice and Refrig., 38* (*1910*), *No. 6, pp. 371–373, figs. 3; 39* (*1910*), *No. 1, pp. 13–15*).—Experiments conducted by the author in the interest of the Santa Fé railroad system with a view to con-

structing a satisfactory precooling system are described, including the general results and conclusions.

Vegetable planting table for the South, S. P. Baldwin (*Gard. Mag.* [*N. Y.*], *12* (*1910*), *No. 1, pp. 15–17*).—This consists of a schedule of instructions for the production of fresh vegetables from November 1 to May 1. It is especially adapted to southern Alabama, southern Georgia, and up to Savannah.

Growing and marketing asparagus, F. Wheeler (*Mass. Crop Rpt.*, *23* (*1910*), *No. 2, pp. 32–37*).—Popular directions are given for growing and marketing asparagus.

On the chemical composition of the cardoon (Cynara cardunculus), E. Peano (*Ann. R. Accad. Agr. Torino, 52* (*1909*), *pp. 97–102*).—Analytical studies were made of three commercial varieties of cardoons for the purpose of determining their food value and their fertilizer requirements.

Truffle culture, O. Mattirolo (*Ann. R. Accad. Agr. Torino, 52* (*1909*), *pp. 3–74, pls. 2, figs. 3*).—This consists of a report on truffle culture in the department of Vaucluse, France, together with suggestions relative to the introduction of its culture into Italy.

An extensive bibliography on truffle culture is appended.

The amelioration of waters intended for irrigating vegetables (*Semaine Agr.* [*Paris*], *29* (*1910*), *No. 1518, pp. 214, 215*).—It is pointed out in this note that acid waters, such as those from swamps, peat holes, etc., should be neutralized before being used for irrigation purposes. This may be accomplished by treating with ashes or lime, preferably in the form of phosphate of lime. The addition of purin likewise produces good effects.

Irrigation of orchards, S. Fortier (*U. S. Dept. Agr., Farmers' Bul. 404, pp. 36, figs. 32*).—The material for this publication is based on the best irrigation practices of the arid region and it is intended for the use of settlers in that region. It discusses selection of land for orchards, typical water supplies, clearing and grading land, planting methods, methods of irrigation, the time to irrigate orchards, number of irrigations per season, duty of water in orchard irrigation, evaporation losses from orchard soils, loss of water due to percolation, removal of waste water, growing crops between the tree rows, and winter irrigation of orchards.

Fruit growing in the arid regions, W. Paddock and O. B. Whipple (*New York, 1910, pp. XX+395, figs. 98*).—This work is presented as an account of approved fruit growing practices in the intermountain country of the western United States, comprising the States of Colorado, Montana, Idaho, Utah, and Nevada, and northern Arizona and New Mexico, with applications to adjacent regions. The greater portion of the subject-matter has previously appeared in the literature of the Colorado Experiment Station.

The successive chapters treat of the history and development of the fruit industry, location, exposure, soils, and wind-breaks, preparation of land for planting, planning and planting the orchard, the orchard plant, buds, pruning young and mature trees, top-working fruit trees, propagation, tillage, fertilizers and shade crops, irrigation, and other phases of orchard management, varieties, harvesting, packing, grading and marketing the fruit, frost injuries, secondary bloom, frost protection, and orchard pests and their control.

The pomology of Calvados, G. Warcollier (*Bul. Assoc. Franç. Pomol., 27* (*1910*), *No. 2, pp. 35–69*).—A study of the present status of pomology in Calvados, France, including information relative to the varieties of pears and apples grown, climate, soil, etc., in various cantons of the department.

[Fruit investigations in New Zealand], W. J. Palmer et al. (*New Zeal. Dept. Agr. Ann. Rpt., 17* (*1909*), *pp. 337–350, 374, 375, 434–436, 451–455*).—This consists of notes on the condition of orchard and small fruits being tested in the

orchards of the New Zealand experimental farms, including also lists of nursery stocks and general information relative to the work for the year.

The protection of orchards in the Pacific Northwest from spring frosts by means of fires and smudges, P. J. O'GARA (*U. S. Dept. Agr., Farmers' Bul. 401, pp. 24, figs. 11*).—This gives in detail the results of successful experiments and the methods employed in preventing frost injury by means of fires and smudges in the apple, peach, and pear orchards of the Rogue River Valley in southern Oregon during the spring of 1909.

The results of the past season's work in the Rogue River Valley have shown that crops valued at from $500 to $1,000 per acre were saved at a total expenditure of not more than $15 to $20 per acre for firing. Wood and coal proved to be the best fuel. The crude oil obtained was more or less mixed with water, and did not burn readily.

Report of chemist, A. W. BLAIR (*Florida Sta. Rpt. 1909, pp. XXV–XXXIV, figs. 2*).—Brief notes are given on the fertilizer experiments with pineapples (E. S. R., 22, p. 640). Extensive analyses are being made of the plants and of the soils of the different fertilizer plats and the results are to be reported in bulletin form.

The station has inaugurated a cooperative citrus experiment to be carried on for 10 years, the object of which is to determine the effect of certain fertilizers, including lime and ground limestone, upon the chemical and physical properties of the soil, upon the trees, upon the quality and quantity of the fruit, and upon their relation to insect pests and diseases. The plan of the experiment is given in detail. The standard formula selected for the young trees is ammonia 5 per cent, from sulphate of ammonia; phosphoric acid, 6 per cent, from acid phosphate; and potash, 6 per cent, from high grade sulphate of potash. Numerous variations from this standard are being tested, together with nitrogen, phosphoric acid, and potash from many different sources.

Analyses of a number of Florida sweet oranges made in 1904 are reported for the first time. Although no final conclusions are drawn from the data secured they indicate that the potash which is removed with a crop of oranges should be replaced and that in many cases more phosphoric acid may have been applied than was necessary. It appears possible that a relationship may be proved to exist between the flavor of the orange and the ratio of acid to sugar in the juice. Some nitrogen and acidity determinations made on a few samples of soils from different groves are also reported.

Cherries in Washington, W. S. THORNBER (*Washington Sta. Bul. 92, pp. 32, figs. 10*).—A popular discussion of cherry culture, taking up location of the orchard, soils, planting, propagation and stocks, top working, cultivation, pruning, harvesting and marketing, and gummosis, and also containing descriptions and notes on varieties of Duke, Morello, Heart, and Bigarreau cherries grown in the station orchard. Many variations as to shape, quality, productivity, and general behavior of these varieties were noted as compared with the same varieties in similar reports from eastern stations.

Insuring the peach crop, C. A. KEFFER (*Tennessee Sta. Bul. 88, pp. 25–33, figs. 3*).—This bulletin deals largely with the results of spraying in the station's experimental peach orchard during 1908 and 1909. Some results are also given of thinning and protection from frost, together with a brief summary of Bulletin 174 of the Bureau of Plant Industry of this Department, previously noted (E. S. R., 23, p. 150).

In the spraying experiments Bordeaux mixture of various strengths, self-boiled lime-sulphur solution, and arsenate of lead were used. Tests of various strengths of Bordeaux mixture indicate that a dilute mixture containing from ½ to 1 lb. of copper sulphate is almost as effective in preventing peach rot as a

stronger mixture and does not injure the foliage appreciably. Bordeaux mixture was of no value as a remedy for peach scab, whereas self-boiled lime-sulphur proved an almost complete preventive of this disease. Self-boiled lime-sulphur was also more effective as a remedy for peach rot. When 2 lbs. per barrel of arsenate of lead was added to the spraying mixture, the fruit on the sprayed trees was noticeably less wormy than on the unsprayed trees. The results of the spraying experiments as a whole indicate that it is profitable to spray. With the 3 varieties most affected by rot, all unsprayed trees produced no marketable fruit whereas there was an average yield of $1.87 per tree from the sprayed trees. The cost of spraying is estimated at 10 cts. per tree for each application, or 30 cts. for the season.

The experiments in thinning have thus far shown the operation to be profitable in producing marketable fruit which, as indicated by check trees, would otherwise have been unsalable.

Coal and wood fires were tried in the orchard as a means of protection from frost with the result that the temperature was raised from 4 to 6° and the crop saved.

The development and aims of grape grafting, K. KROEMER (*Jahresber. Ver. Angew. Bot., 7 (1909), pp. 1–22*).—A review of our knowledge relative to the grafting of grapes, including an extensive bibliography on the subject.

Notes on some cacaos at the Dominica Botanic Station, J. JONES (*West Indian Bul., 10 (1910), No. 4, pp. 337–343, pls. 2*).—Descriptive notes are given of the alligator cacao (*Theobroma pentagona*), and the tiger cacao (*T. bicolor*), together with a brief note on the monkey cacao (*T. angustifolia*). Cultural experiments with the alligator cacao show that it is quite unsuitable for the conditions existing in Dominica owing to its delicate character and its tendency to become affected with canker of the stem.

The committee on researches and experiments, A. FREDHOLM ET AL. (*Proc. Agr. Soc. Trinidad and Tobago, 10 (1910), No. 6, pp. 183–208*).—This is the report of the committee on subjects selected for cooperative investigation and relating for the most part to various phases of the cacao industry. The experiments are described and the form of record to be used in each case is shown.

Pruning coffee, A. P. DO AMARAL (*Bol. Inst. Agron. [São Paulo], 1909, No. 12, pp. 420–434, figs. 4*).—Practical suggestions are given for pruning and disbudding coffee.

The inheritance of peloria and flower color in foxgloves (Digitalis purpurea), F. KEEBLE, MISS C. PELLEW and W. N. JONES (*New Phytol., 9 (1910), No. 1–2, pp. 68–77, figs. 2; abs. in Gard. Chron., 3. ser., 47 (1910), No. 1226, p. 417*).—From these experiments, which were conducted at the Botanic Laboratory, University College, Reading, the following conclusions were reached:

"Peloria in foxgloves is a Mendelian recessive to normal. Peloric flowers and also the nonpeloric flowers of peloric plants carry the recessive character. The allelomorphs responsible for color are as follows: Mm, M being magenta color factor, dominant to m; Dd, D being a darkening factor dominant to d and converting magenta to purple; and Ww, W being a dominant white factor in the presence of which the expression of color due to M is inhibited so that the flowers are white. All flowers appear to be spotted. In the presence of the color factor M, spots are red; in the absence of M they are yellow-brown. The presence of the dominant white factor W does not inhibit the expression of the color factor M in regard to the spots (at least when present as a heterozygote=Ww). The suggestion that dominant white acts differentially on ground color, inhibiting it generally but not in spot-areas, may prove of service in explaining the origin of bars, spots and stripes in plants and animals and also the behavior of certain eversporting varieties."

On the synonymy of roses (*Jour. Soc. Nat. Hort. France, 4. sér., 11 (1910), June, pp. 382–396*).—A discussion before the International Congress of Rose Growers, held at Paris in 1910, relative to the synonymy of roses. It includes a list of a large number of roses, showing both the original name and synonym, including the dates of introduction and the introducer when known.

Our garden flowers, HARRIET L. KEELER (*New York, 1910, pp. XXI+550, figs. 276*).—The purpose of this work is to acquaint the flower lover with all the annual and perennial flowering herbs, commonly found in a hardy garden, relative to their native land, their life history, and their structural affiliations. The flowers are described under families and species. The text is fully illustrated and a list of the genera and species discussed precedes the descriptions.

Hardy plants for cottage gardens, HELEN R. ALBEE (*New York, 1910, pp. VI+309, pls. 39, figs. 2*).—An account of the author's failures and successes in garden making, including cultural details and suggestions on garden design, together with classified descriptive lists and cultural notes on white, blue, yellow, pink, and red perennial flowers and flowering shrubs, arranged both as to color and month of blooming.

The ideal garden, H. H. THOMAS (*London and New York, 1910, pp. XII+276, pls. 112*).—A popular work on floriculture and the general development of home gardens. It discusses the making of various forms of gardens and plants suitable therefor. It also contains a working calendar for 6 months of the year with a list of hardy perennials for the flower border.

The landscape beautiful, F. A. WAUGH (*New York, 1910, pp. X+336, pls. 49*).—This popular work, consisting of a collection of 17 essays, is presented as a study of the utility of the natural landscape and its relation to human life and happiness, with the application of these principles in landscape gardening and in art in general.

FORESTRY.

Experimental determination of the relation of forests to stream flow, F. H. BRANDENBURG (*Mo. Weather Rev., 38 (1910), No. 5, p. 770*).—This is a brief statement regarding experiments undertaken near Wagon Wheel Gap, in Mineral County, Colorado, by the Weather Bureau in cooperation with the United States Geological Survey and the Forest Service, "to determine as accurately as possible the difference in behavior of two streams, one flowing from a watershed which is covered with forest growth, and the other from a watershed which has been denuded of its forest cover." The streams on which the measurements are to be made are small tributaries of the Rio Grande.

Relation of deforestation to precipitation and run-off in Wisconsin, W. C. DEVEREAUX (*Mo. Weather Rev., 38 (1910), No. 5, pp. 720–723, figs. 2*).—This article is based mainly upon observations made in the Wisconsin River Valley above Portage and the Wolf River Valley above New London, two large and important valleys which are fairly well covered by long and reliable records. The discussion is summarized as follows:

"Deforestation began about 70 years ago in northern Wisconsin, has been continuous since that time, and at the present time about one-half of the land is denuded.

"Deforestation has had no appreciable effect on the precipitation.

"Deforestation proper has not changed the stream flow, but farm drainage and the improvement of the small streams may have increased the rate of run-off slightly."

The forests of Alaska, R. S. KELLOGG (*U. S. Dept. Agr., Forest Serv. Bul. 81, pp. 24, pls. 9, fig. 1*).—A report on the forests of Alaska based upon personal observations made by the author in the summer of 1909, and other sources of

information. It discusses physical features, climate, forest types along the coast and in the interior, their utilization, and the future of Alaskan forests.

"Obviously all the forests of Alaska, whether on the coast or in the interior, should be protected and made of the utmost permanent use. The coast forests, which include most of the saw timber of the Territory, and by far the heaviest stands, are nearly all protected by National Forests. They have not been damaged by fire, and are but slightly reduced by cutting. They are over-mature. Carefully planned cutting should take place as soon as possible. Every effort should be made to have them utilized for lumber, and especially for pulp. They should be so managed as to increase the stand of spruce and decrease that of hemlock. In the interior forests, situated entirely upon public lands, unregulated cutting and devastating fires are going on. Their protection can not begin too soon. While the products of the coast forests need a foreign market, the interior forests with the best of treatment are not likely to supply more than a part of the home demand. If protected they will continue to furnish logs for cabins, low-grade lumber, and fuel indefinitely."

Forest, shade and ornamental trees in Washington, W. S. THORNBER (*Washington Sta. Bul. 90, pp. 55, figs. 8*).—This is a bulletin of information relative to the kinds of trees suitable for ornament, shelter, and forest purposes in Washington, including suggestions on the planting and care of trees. Part 1 discusses in detail the propagation of forest and shade trees and part 2 contains notes on the growth of a large number of species which were planted in the college and station grounds some 15 years ago. Lists are also given of trees suggested for planting for street and shade, the lawn, wind-breaks, screens, and for fuel purposes.

The life history of lodgepole burn forests, F. E. CLEMENTS (*U. S. Dept. Agr., Forest Serv. Bul. 79, pp. 56, pls. 6, fig. 1*).—This bulletin consists of a study of the burned over forests of Estes Park, northern Colorado, in which various burns, which are calculated to have occurred at different periods since 1707, have been reconstructed to a certain degree and studied with reference to their effect, particularly on lodgepole pine reproduction. In addition to the general examination of past and present conditions of these areas, consideration is given to cone and seed production, the opening of cones, distribution of cones and seeds, the germination of seeds, relation of development and growth to light and water, and of reproduction to competition, relative rate of growth, and the future development and treatment of lodgepole forests.

The author finds that although lodgepole pine can mature cones as early as its fifth year, the cones usually appear about the tenth or twelfth year. This indicates the length of time which fire must be kept out to permit reproduction. The number of cones produced depends chiefly upon the density of the individuals as expressed in the competition between them. There is no fixed relation between the amount of seed and the number of cones. Generally speaking, the older the tree or branch bearing the cone, the greater the percentage of seed. Contrary to a rather common opinion most of the cones in a lodgepole forest open naturally without the aid of fire. The cones open irregularly, however, from year to year and fire is of importance in releasing the seed from the older cones, and in driving away rodents inimical to reproduction. In some germination tests it was found that seeds from 50 to 75 years of age will germinate.

The minimum light intensity for lodgepole reproduction is 0.1 of full sunshine. Although a fair reproduction may occur at as low as 0.2 it is much inferior to that of full sunshine. The light of a mature forest is not sufficiently intense to permit of reproduction. The maximum water content for lodgepole is 35 per cent in loam and about half as great in sand and gravel,

and the minimum may fall below 5 per cent in gravel without injury to the tree except in decreasing its rate of growth. The optimum water content is between 12 and 15 per cent. The behavior of lodgepole pine in dry situations seems to warrant its use in afforestation experiments on the Great Plains.

A well-developed forest cover either greatly reduces the amount of lodgepole germination or causes the death of many of the young seedlings through competition. The importance of working out a method of artificial control of the forest cover is pointed out. Although lodgepole is inferior in the quality of its wood to some of its competitors, its more rapid growth largely offsets this disadvantage, and warrants its use in the afforestation of watersheds where quick growth is required.

In conclusion the future development and treatment of lodgepole forests are discussed.

The application of recent knowledge and skill in pine seed kilns, WIEBECKE (*Ztschr. Forst. u. Jagdw., 42 (1910), No. 6, pp. 342–360*).—With the results of his own investigations as well as those of Haack (E. S. R., 21, p. 441) and others as a basis, the author discusses improved practical methods for drying and storing pine seeds. Detailed plans are given for a seed kiln and storage house as worked out for a number of seed firms.

The histology of resin canals in white fir, C. D. MELL (*Amer. Forestry, 16 (1910), No. 6, pp. 351–356, figs. 9*).—Descriptions are given of the structure of the different groups of resin canals in white fir as worked out by Dippel and reported in 1863.

Stand conversion in Vienna woods, T. MICKLITZ (*Centbl. Gesam. Forstw., 36 (1910), No. 6, pp. 243–257*).—In this article the author points out that owing to the diminishing financial returns from the pure beech stands in the northeastern part of the Vienna woods, these stands should be converted into beech-oak or fir-spruce-beech stands, according to the locality. He discusses means for bringing about these conversions, together with the work which has already been done along this line.

Sixth annual report of the state forester of Massachusetts, F. W. RANE (*Ann. Rpt. State Forester Mass., 6 (1909), pp. 109, pls. 11, fig. 1*).—This consists of a statement of results obtained during 1909, including a record of expenditures and recommendations concerning the future needs of the department. Part 1 discusses general forestry and deals with the examination of woodlands and practical assistance given owners, reforestation, forest nursery work, forest fires for the year and protective measures used, forest education, literature, and propaganda work.

Part 2, giving a detailed account of the work of suppressing the gipsy and brown-tail moths, is noted on page 463 of this issue.

The impregnation of growing timber, L. OTTINGER (*Jour. Soc. Chem. Indus., 29 (1910), No. 9, pp. 539, 540*).—The author briefly describes the method invented by L. S. Gardner for impregnating growing timber by the distribution of artificial coloring matter through the fibers of the wood.

Guayule (Parthenium argentatum), R. ESCOBAR (*Estac. Agr. Expt. Ciudad Juárez, Chihuahua, Bol. 25, pp. 30, pl. 1*).—An account of the guayule rubber shrub relative to its history, botany, distribution, exploitation, extraction of rubber, and reproduction.

DISEASES OF PLANTS.

Some fungus diseases of economic importance, FLORA W. PATTERSON ET AL. (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 171, pp. 41, pls. 8, figs. 3*).—In the first part of this bulletin, discussions and technical descriptions are given of the following diseases: A sedge disease (*Kawakamia cyperi*) prevalent at

Pierce, Tex., on *Cyperus tegetiformis*, a Chinese species of sedge introduced for use in the matting industry; witches' broom of bamboo (*Loculistroma bambusæ* n. g. and sp.), forming sclerotia-like bodies similar to those of *Claviceps purpurea* at the nodes of a bamboo (*Phyllostachys* sp.) from Hankow, China; a peony disease caused by *Botrytis pæoniæ;* a chrysanthemum disease due to *B. cinerea;* a disease of cyclamen caused by *Glomerella rufomaculans cyclaminis* n. var.; and a Stemphylium (*S. citri* n. sp.) on oranges in Arizona.

In the second paper, Pineapple Rot Caused by *Thielaviopsis paradoxa*, the results are given of a series of experiments on pineapple rot. This disease so reduces the profits of shippers as to be in a sense prohibitive to the transportation of fruit from some localities. The methods of checking this disease by fumigation with formaldehyde gas are described. It was found that from 1,200 to 1,300 cc. of formalin per 1,000 cu. ft. of air space was fatal to *T. paradoxa* when used in an air-tight compartment at a temperature of 65 to 80° F. and a humidity of 38 per cent for 30 minutes or more. The formaldehyde gas was liberated by pouring 40 per cent formalin on potassium permanganate at the rate of 100 cc. of formalin to 50 gm. of permanganate.

Report of plant pathologist, H. S. Fawcett (*Florida Sta. Rpt. 1909, pp. XLVI–LXII, figs. 6*).—The investigations for 1909 were mainly confined to the scaly bark (*Hormodendron* sp.) and other diseases of citrus trees.

By cultures and inoculation tests on young orange trees, the initial cause of the disease was found to be a fungus belonging to the genus Hormodendron, but extended observations seem to indicate that withertip fungus (*Colletotrichum glœosporioides*) associated with the Hormodendron as a secondary agent caused most of the injury from the disease. It was found that the main period of infection was between June 1 and December 1, which corresponds fairly well to the rainy season in Florida.

The disease rarely appears on twigs less than 6 months old, and is most severe on wood 9 to 18 months old. On the fruit it first appears about 4 or 5 months after the bloom has been shed.

To control the scaly bark 4 principal lines of treatment were tested, viz, (1) spraying with Bordeaux mixture, (2) pruning, (3) heading back and painting with carbolineum, and (4) spraying with dilute solutions of carbolineum. The results of the experiments with Bordeaux mixture (5:5:50), together with observations as to the time of greatest infection, indicate that 3 applications would be quite effective in preventing the fruit from spotting, and would materially lessen the injury to the limbs of the trees. The first application should be made just before the blooms open, the second after the fruit is fairly set, and the third in the latter part of July or early August. It was also found that one thorough spraying with the Bordeaux mixture in November diminished the quantity of spotted fruit during the following year.

After heading back by cutting out the tops, leaving only the trunks and stubs of the larger limbs, and the removal of all foliage and small suckers, the entire surface of the bark was painted over with a 1:1 mixture of carbolineum and soapy water, which treatment produced very satisfactory results in controlling the disease. The pruning out of all dead wood and badly diseased branches was clearly beneficial in lessening the sources of infection during the first year, but the disease gradually came back into the trees thus treated.

Attention is called to, and remedies suggested for, gummosis and scab (*Cladosporium citri*) of citrus trees; buckskin of grapefruit and sometimes of sweet oranges; white rust (*Peronospora parasitica*), stem rot of seedlings (*Corticium vagum solani*), leaf spot (*Alternaria brassicæ*), and black rot (*Pseudomonas campestris*) of cabbage; mildew (*Microsphæra euphorbiæ*) on cowpeas; and

mildew (*M. alni*), scab (*Fusicladium effusum*), leaf blotch (*Cercospora halstedii*), rosette, and dieback on pecans.

Report of assistant plant physiologist, B. F. FLOYD (*Florida Sta. Rpt. 1909, pp. LXIII–LXXVIII, figs. 16*).—The results of experiments on overfertilization with cotton-seed meal, blood and bone, and dried blood as one of the causes of dieback of citrus trees indicate that the disease is aggravated by maximum fertilization with certain forms of fertilizers. The greatest detrimental effect was noticed with nitrate of soda.

Observations on yellow spotting of citrus leaves show that it is widely distributed throughout Florida, while its prevalence and severity vary considerably in different groves in the same locality. The disease is not confined to any particular variety of citrus trees, but is most evident on the grapefruit. No cause has been found for the disease, and no remedies for its control are suggested.

The gross and microscopical appearances of chlorosis of cassava are given. The cause apparently is a physiological one due to unfavorable soil conditions, and may be avoided by planting upon rich soil where conditions are most favorable to growth.

Mutualism in certain parasitic bacteria and fungi, T. F. MANNS (*Abs. in Science, n. ser., 31 (1910), No. 803, pp. 797, 798*).—A synopsis is given of the results of investigations on a disease of oats which has been experimentally shown to be due to two species of bacteria (E. S. R., 22, p. 453).

The author believes there exist similar relationships among fungi in the production of disease, in which the associated organism may be only semiparasitic, following closely on the specific cause of the disease. Such relationship, he thinks, occurs between the Fusarium of potato wilt and certain species of Vermicularia, and experiments are now in progress to determine this fact.

Two barley blights, with comparison of species of Helminthosporium upon cereals, L. H. PAMMEL, CHARLOTTE M. KING, and A. L. BAKKE (*Iowa Sta. Bul. 116, pp. 178–190, figs. 4*).—The results are reported of investigations on the yellow leaf disease of barley (*H. gramineum*), which was prevalent in some barley fields at Ames, Iowa, appearing just before the heading of the grain, and on late blight (*H. sativum*), which manifested itself in the form of brownish, circular, dark-colored spots, soon causing the leaves to become brown, and also occurring upon the glumes and spikelets.

This late barley blight, which did much damage, is the most serious barley disease of Iowa, and is apparently transmitted with the seed.

The bulletin closes with a discussion of the described diseases on barley due to species of Helminthosporium and a list of the species of Helminthosporium found on Gramineæ and their characters.

Rhizoctonia stem rot of beans, M. F. BARRUS (*Abs. in Science, n. ser., 31 (1910), No. 803, pp. 796, 797*).—While working on bean diseases in the vicinity of Oneida, N. Y., during the summer of 1908, the author observed a large number of plants affected with cankers on the parts of the stems below or at the surface of the ground. During the following season at the same place the disease was found as prevalent as the year before. An examination of diseased stems or pods placed in moist chambers showed the characteristic mycelium and the sclerotia of Rhizoctonia. Inoculations of healthy pods resulted in the production of the characteristic cankers. As yet no perfect stage of the fungus has been observed.

The author is carrying on experiments with this organism and with a culture of *Corticium vagum* in an endeavor to discover whether they are not identical.

An anthracnose of red clover caused by Glœosporium caulivorum, H. R. FULTON (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 752*).—A description is given of an anthracnose of clover which is characterized by sunken areas on the stem, the spots having dark borders and lighter centers.

Inoculation tests indicate that infection takes place most readily through wounds, or upon succulent parts, or under very moist conditions. Under field conditions the disease may spread rapidly during warm showery weather. Successful inoculations were made with the organism on various varieties of red and alsike clover, but unsuccessful attempts were made to inoculate white clover and alfalfa.

Rotation of crops and early mowing of affected fields are recommended as control measures.

Four years' results in selection for a disease-resistant clover, S. M. BAIN and S. H. ESSARY (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 756*).—In 1906 the authors described a disease of clover due to Colletotrichum (E. S. R., 18, p. 448), and in the present paper an account is given of the results of selections for disease resistance. This resistance has been maintained in a number of varieties for five consecutive generations, and about 50 acres of resistant clover is being grown as a seed crop in 1910.

In addition to the account relating to resistance to the anthracnose, attention is called to the possibility of resistance to rust.

A new hop mildew, J. J. DAVIS (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 752*).—A downy mildew of hops is described, which is said to be due to *Pseudoperonospora celtidis humuli* n. var.

The wilt disease of pigeon pea and the parasitism of Neocosmospora vasinfecta, E. J. BUTLER (*Mem. Dept. Agr. India, Bot. Ser., 2 (1910), No. 9, pp. 64, pls. 6*).—In investigations carried on by the author regarding the wilt diseases of cotton, indigo, chick peas, and pigeon peas, inoculation with the ascospores of *N. vasinfecta* did not result in a single case of wilt. He concludes that this fungus is a common soil saprophyte, which develops its perfect form on rotting roots of several different plants and is wholly unconnected with the wilt diseases of the particular plants investigated thus far in India, and he questions whether the fungus is parasitic in the United States.

In his study of the pigeon pea wilt the author has found constantly present a species of Fusarium and associated with it three other organisms, but he attributes the wilt to the Fusarium, which he describes under the name *F. udum* n. sp., a preliminary account of which has already been noted (E. S. R., 23, p. 246). A description is given of the parasite and its cultural and other biological characters, followed by a discussion of the possibility of controlling it by means of breeding resistant strains.

Bacillus phytophthorus, E. F. SMITH (*Abs. in Science, n. ser., 31 (1910), No. 802, pp. 748, 749*).—A report is given of an extended study on this organism, which causes in Germany the disease of potatoes known as blackleg. The cause of this disease has been described by Appel (E. S. R., 15, p. 374) and the author has verified his conclusions.

The disease caused by this organism is compared with that due to *B. solanisaprus* (E. S. R., 18, p. 646) and *B. atrosepticus*, and it is stated that the organisms are similar but not identical. The organism of the blackleg of potatoes has been isolated by the author from potatoes grown in Maine and in Virginia, indicating that it is widespread in this country.

Further studies of Phytophthora infestans, L. R. JONES and B. F. LUTMAN (*Abs. in Science, n. ser., 31 (1910), No. 802, pp. 752, 753*).—A description is given of investigations that have been carried on with this potato parasite. As

a result of cultural experiments what are probably the resting spores have been found, as noted elsewhere (E. S. R., 22, p. 346).

A method of testing disease resistance of the tubers has been devised, in which sterile living plugs cut from the tuber are inoculated with the fungus and the amount of growth compared after 9 to 12 days. In this way it has been found possible to estimate quite accurately the degree of resistance or susceptibility to disease.

Outbreak of potato canker in Newfoundland, and the danger of its introduction into the United States, H. T. Güssow (*Abs. in Science, n. ser., 31 (1910), No. 803, p. 796*).—The presence of potato canker (*Chrysophlyctis endobiotica*) in Newfoundland is reported, and the possibility of its introduction into the United States and Canada is pointed out. A description of the disease and its causal fungus has been given elsewhere (E. S. R., 22, p. 545).

Wart disease of potatoes checked by greening (*Jour. Bd. Agr.* [*London*], *17 (1910), No. 1, pp. 46, 47*).—In a brief note it is stated that the greening of potatoes checks to some extent the development of the wart disease due to *Synchytrium (Chrysophlyctis) endobioticum*. The infection seems to be only through the eye of the potato, and where sprouts had been produced through the process of greening a high degree of immunity was obtained.

Potato wilt and dry rot (Fusarium oxysporum), W. A. Orton (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 751*).—A note is given on this disease, which has been previously described (E. S. R., 15, p. 1088). The author states that it is becoming one of the most widespread and destructive diseases of potatoes, appearing to occur throughout the United States, but most serious in the irrigated sections of the West and in the southern half of the potato belt.

Three types of injury occur. The most serious and least recognized is a wilting and premature ripening of the plant due to infection of the stem and underground portions. The second form is a dry rot beginning at the stem, which develops most rapidly in warm temperatures, and third, the fungus is responsible for a considerable portion of the poor germination in the spring.

Of methods for control the selection of seed tubers seems to be the most promising. A thin slice cut across the stem end of the potato forms a simple test, the vascular ring being brown where the fungus is present. While there are indications that resistance can be bred, the author states that no existing varieties are known to be very promising in this regard.

Sulphur injury to potato tubers, W. A. Orton and Ethel C. Field (*Abs. in Science, n. ser., 31 (1910), No. 803, p. 796*).—During the progress of experiments in California in 1909 for the control of the potato scab, it was found that when the crop was dug many tubers from the sulphured rows showed sunken, dark spots from 5 to 30 mm. in diameter, which were relatively free from fungus or bacterial infection. These spots occurred only in tubers from sulphured rows and were more numerous in the heavily sulphured plats, but were present even where the seed pieces had been merely dipped in sulphur. Experiments in the laboratory with potatoes exposed to sulphur fumes resulted in the development of similar spots.

This injury has apparently not been observed in sulphur experiments conducted in the East, and it is thought that it may be due to the fact that the California soils were peaty and became quite dry near the surface so that volatilization of the sulphur was effected.

Potato spraying experiments in 1909, F. C. Stewart et al. (*New York State Sta. Bul. 323, pp. 17–52*).—The results are given of 26 separate experiments, these constituting the eighth year of work in a ten-year series of potato spraying experiments with Bordeaux mixture, together with a summary of results obtained each year to 1909, inclusive.

In 1909 the gains per acre at the station were 49.75 bu. from spraying every 2 weeks, and 38.67 bu. from spraying 3 times; at Riverhead the corresponding gains were 52.5 bu. and 28.67 bu. For the entire 8 years' spraying the average gains at the station were 102 bu. per acre from spraying every 2 weeks, and 78 bu. per acre from 3 applications; at Riverhead the corresponding gains were 54 bu. and 29 bu.

A summary of the farmers' business experiments during 1909 showed an increase in yield per acre due to spraying of 24.4 bu., and an average net profit per acre of $9.55. The average increase in yield for 7 years was 41.1 bu., and the average net profit $16.77 per acre.

Potato spraying severely tested, F. H. Hall (*New York State Sta. Bul. 323, popular ed., pp. 8*).—A popular edition of the above.

The curly top disease of sugar beets, H. B. Shaw (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 756*).—A description is given of the symptoms characterizing this disease and attention called to the fact that the resistance to it varies according to the size of the beets. Certain experiments showed that leaf hoppers are the primary cause of the disease, and observations have indicated that it may develop the second season in beets planted for seed production although no symptoms were present when the beets were harvested the preceding fall.

Colletotrichum falcatum in the United States, C. W. Edgerton (*Science, n. ser., 31 (1910), No. 801, pp. 717, 718*).—During the past two years, while studying the diseases of sugar cane, the author has made a careful search for those fungi which are troublesome in other countries but which have not yet been reported in the United States. One of these diseases, caused by the fungus *C. falcatum*, has been found during the past year in Louisiana. This fungus is said to sometimes cause immense losses in Bengal (E. S. R., 18, p. 450).

When first observed the author did not positively differentiate the fungus from a similar one, *C. lineola*, which occurs abundantly on Johnson grass. Further studies, however, have shown *C. falcatum* to be the cause of the sugar cane disease commonly referred to as the red rot. In addition to observing it on material in Louisiana, diseased specimens were sent the author from Georgia, indicating that the fungus has become somewhat distributed in this country.

In studying this and the species occurring on Johnson grass, inoculation experiments were made with them. *C. lineola* developed fruiting organs to some extent at the point of inoculation, but would not spread into healthy tissues on the sugar cane. The morphological characters of the two fungi are said to be very similar if not identical.

Timothy rust in the United States, E. C. Johnson (*Abs. in Science, n. ser., 31 (1910), No. 803, pp. 791, 792*).—The author states that timothy rust was reported in the United States as early as 1882 and that its presence in Iowa was noted in 1891. From that date to 1906 there appears to have been no mention of the parasite in the United States, but in the latter year the rust became epidemic in the timothy-breeding plats of this Department at the Arlington Experiment Farm. Since that time it has been common in many localities and is reported from nearly all the States east of the Mississippi and north of Tennessee, with the exception of the New England States, New Jersey, and Illinois. It is also known to occur in Minnesota and Iowa.

The rust in general appearance and morphological characteristics resembles *Puccinia graminis* on wheat. Investigations by Eriksson and Henning (E. S. R., 6, p. 146) with the rust of timothy led them to describe it as *P. phlei-pratensis*. By others it is regarded as a race or physiological species of *P. graminis*.

Inoculation experiments have demonstrated that the rusts in the United States and in Europe are identical, although the species is not a well fixed one. It is readily transferred to a number of species of grasses, among them oats,

rye, tall fescue, orchard grass, and *Poa compressa*. Direct inoculations on wheat and barley gave negative results.

An examination of timothy plants during the winter showed that the rust mycelium winters over in the vicinity of the Arlington Experiment Farm, while the teleutospore stage is more common in Pennsylvania and New York. The æcidial stage is believed to be rare in the United States.

The breeding work has indicated varietal resistance to the rust, although no strains have been found that are entirely immune.

Mycological studies upon wheat and wheat soils to determine possible causes in deterioration in yield, T. D. BECKWITH (*Abs. in Science, n. ser., 31 (1910), No. 803, p. 798*).—Analysis of soils having failed to account for the deterioration in yield, biological studies were made of wheat soils, comparing them with virgin prairie soil. A number of organisms were obtained, among them species belonging to the genera Colletotrichum, Fusarium, Macrosporium, and Alternaria.

To ascertain whether the spores of these fungi were normally present on wheat stems, sections were made of the stems of wheat and placed in culture tubes. After 5 days' incubation Colletotrichum, Macrosporium, Helminthosporium, and Cephalothecium were found present in varying proportions. This series of experiments showed the possibility of infection and that the spores were either resting on the wheat plants or had already germinated.

Another series of experiments was conducted in which the stems were sterilized and then incubated, with the result that the fungi again were found abundant. Finally culture experiments made from roots of wheat grown in old wheat soil showed the presence of Colletotrichum, Fusarium, and Macrosporium.

These experiments are believed to show that old wheat soil is infected with certain fungi, that the spores or mycelium are found normally in or on the wheat plant, and that a certain percentage of the wheat is pathologically infected with these fungi, some of which also cause root infection.

Floret sterility of wheats in the Southwest, E. C. JOHNSON (*Abs. in Science, n. ser., 31 (1910), No. 803, p. 792*).—Attention is called to the floret sterility of wheat, or the nondevelopment of the kernels in florets of otherwise normal spikelets, as being especially common in Texas and Oklahoma.

Investigations at San Antonio, Tex., showed from 30 to 50 per cent sterile florets in wheat in 1908 and from 12 to 15 per cent in 1909. An examination of the sterile florets showed that they were almost invariably attacked by fungi, *Cladosporium graminum* and *Stemphylium* sp. being present. In addition rusts were abundant, but the experiments show that the chief cause of the injury is *S. tritici*. (See below.)

Stemphylium tritici n. sp. associated with floret sterility of wheat, FLORA W. PATTERSON (*Bul. Torrey Bot. Club, 37 (1910), No. 4, p. 205*).—A technical description and a brief account are given of *S. tritici* n. sp., a fungus that appears to be of considerable pathological importance, as artificial inoculations have resulted in the production of 9 per cent of sterile florets.

On the relationship of certain bacterial soft rots of vegetables, W. J. MORSE and H. A. HARDING (*Abs. in Science, n. ser., 31 (1910), No. 803, p. 791*).—This is an account of investigations carried on by the authors, the results of which have been published elsewhere (E. S. R., 22, p. 649).

Malnutrition diseases of cabbage, spinach, and other vegetables, L. L. HARTER (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 747*).—This is a brief abstract of studies by the author, a more extended account of which has been noted elsewhere (E. S. R., 22, p. 147).

Report of assistant in botany, R. Y. WINTERS (*Florida Sta. Rpt. 1909, pp. LXXIX–LXXXV, figs. 12*).—Dry Bordeaux mixture and air-slaked lime were

both successfully used in checking celery damp-off (*Sclerotinia libertiana*). An investigation of celery blight (*Cercospora apii*) led to the conclusion that the disease was in the soil rather than in the celery seed, although the bed had only recently been cleared. Inquiries made led to the information that the tested soil had been a dumping ground for trash and refuse from a neighboring celery field.

Notes are given on a number of varieties of eggplants and radishes being tested at the station.

Mildew of ginseng, H. H. WHETZEL (*Abs. in Science, n. ser., 31 (1910), No. 803, pp. 790, 791*).—The mildew of ginseng, due to *Phytophthora cactorum*, has been known in Japan for some years, a previous account of it having been noted elsewhere (E. S. R., 19, p. 752). The disease was reported by Van Hook (E. S. R., 18, p. 342) as occurring in New York and Ohio in 1905.

The author has observed it since that time and states that it appeared in epidemic form in New York in 1909. A careful study showed the presence of Phytophthora in abundance, and inoculation experiments resulted in prompt infection. It is stated that as much as 20 per cent loss was occasioned by this fungus in some beds in New York.

Lettuce sclerotiniose, F. L. STEVENS and J. G. HALL (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 752*).—A brief summary is presented of some of the results of experimental investigations on a sclerotina disease of lettuce, together with statistical and physiological studies on the fungus.

Special attention has been given the parasitism and saprophytism of the organism, and it is believed that the ascospores and the mycelium are short lived and that the sclerotium is the only long-lived structure. The early destruction of affected plants through the prevention of formation of sclerotia is believed to be a promising means for the eradication of this disease.

A fungus enemy of mushroom growing, FLORA W. PATTERSON (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 756*).—The author describes the fungus *Mycogone perniciosa* which has been received from mushroom beds in Pennsylvania. The disease caused by this fungus has been long recognized as a serious one in Europe, but apparently has not been previously reported in this country.

A new tomato disease of economic importance, E. F. SMITH (*Abs. in Science, n. ser., 31 (1910), No. 803, pp. 794–796*).—The author's attention was called in 1909 to a stem disease of tomatoes prevalent in the vicinity of Grand Rapids, Mich. A microscopical examination showed the absence of fungi and great numbers of bacteria, and from poured plates a yellowish bacterium was obtained. Inoculation experiments have shown that this organism readily produces the characteristic disease and that, unlike the southern bacterial disease of tomatoes, which results in a sudden collapse of the plant, the progress of the new tomato disease is comparatively slow.

The loss occasioned during 1909 in the vicinity of Grand Rapids, Mich., is said to have amounted to from $8,000 to $10,000. The author believes that the disease is prevalent in many other parts of the northern United States, but has hitherto been confused with the more rapidly acting disease due to *Bacterium solanacearum*. The organism is tentatively described as *B. michiganense* n. sp.

Anthracnose of the blackberry and raspberry, W. H. LAWRENCE (*Washington Sta. Bul. 97, pp. 3–18, figs. 5*).—On account of the yearly failure of a considerable percentage of the fruit of the Snyder blackberry to develop properly an investigation of the causes was undertaken, and a report is made of cooperative and other tests with recommendations as to methods of preventing this trouble.

The cause was found to be anthracnose (*Glœosporium venetum*), which in the Puget Sound country attacks the Snyder, Kittatany, and Himalaya Giant

blackberries, the Lucretia dewberry, Logan berry, Antwerp and Cuthbert red raspberry, and the Cumberland black raspberry, and is especially injurious to the Snyder and Kittatany blackberries, attacking the stems, leaves, and fruit.

The fungus attacks the current year's growth of shoots when they are 6 to 12 in. in height, but does not spread on the stems and leaves after the branches form. On the Snyder and Kittatany blackberry the fungus spreads from the stems and leaves to the young fruit, and continues to spread on the fruit during the entire season, damaging it more or less severely.

To check the ravages of the disease the infested leaves should be destroyed, and badly diseased canes should be cut out before the leaves fall and burned. As a preventive measure, spray with 4:4:50 Bordeaux mixture before the leaves appear, using a second application when the leaves are fully expanded, and a third application just before the blossoms appear.

The double blossom, M. T. Cook (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 751*).—The author briefly describes a disease of Rubus due to the fungus *Fusarium rubi*. This trouble is abundant in Delaware and Maryland, where it is quite destructive to the varieties of dewberries Lucretia and Rathbone. It winters in the buds and the spores are formed in the open blossom, resulting in the formation of witches' brooms, a deformity of the blossoms, and atrophy of the berries. Late blossoms are formed abundantly, but these also contain spores.

Sclerotinia or die-back disease of the gooseberry, E. S. Salmon (*Jour. Bd. Agr. [London], 17 (1910), No. 1, pp. 1–9, pls. 2, fig. 1*).—The author describes a disease of gooseberries that is due to a species of Sclerotinia, which is said to be distributed throughout quite a portion of England. The fungus attacks the main stem and bases of the branches, the young wood, leaves, and berries, causing the rotting of the berries and the more or less complete destruction of the wood.

For the control of the disease the prompt removal and burning of all dead bushes or branches are recommended. Where the disease has become widespread, spraying may be resorted to. Anything that will induce a rapid, vigorous growth of the bushes is said to stop the development of the fungus.

On the treatment of downy mildew of grapes by means of oxychlorid of copper, E. Chuard (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 13, pp. 839–841*).—In a previous publication (E. S. R., 19, p. 155) the author called attention to the value of oxychlorid of copper for the control of the downy mildew of the grape. This substance he has been using since 1906, and during 1909 it was extensively employed in a number of important grape-growing districts of France with great success. It is said to be a product directly obtained in the electrolytic manufacture of soda or potash by the Granier method in which metallic copper anodes are used. It is a noncrystalline powder, insoluble in water, but sufficiently fine to be readily held in suspension while being applied as a fungicide. The compound contains about 50 per cent copper, and when used at the rate of 500 gm. per hectoliter (about 19 gm. per gallon) it has given results comparable with those obtained with 2 per cent Bordeaux mixture.

Copper oxychlorid as a fungicide for the grape mildew, E. Chuard (*Terre Vaud., 2 (1910), No. 18, pp. 205, 206*).—A description is given of copper oxychlorid, which the author says is marketed under the name Cuprosa Powder or, when mixed with sulphur, as Cuprosa Sulphur. Attention is called to its value as a possible substitute for other fungicides.

Fungus diseases of the apple and pear, F. L. Stevens (*North Carolina Sta. Bul. 206, pp. 87–126, figs. 29*).—Descriptions are given of several diseases of

the apple and pear, together with methods of treatment. Formulas and directions for preparing the standard fungicides are appended.

Fire blight of pear and apple, H. S. JACKSON (*Oregon Sta. Circ. 7, pp. 16, figs. 9*).—This circular is a summary of the known facts compiled from various sources concerning the characteristics, dissemination, and methods of control of this disease.

Frog-eye disease of apple leaves, J. L. SHELDON (*Abs. in Science, n. ser., 31 (1910), No. 803, p. 797*).—The history, cause, and present distribution of a disease of apple foliage, due to *Illosporium malifoliorum*, are given.

Venturia inæqualis, ascospore dissemination and infection, E. WALLACE (*Abs. in Science, n. ser., 31 (1910), No. 802, pp. 753, 754*).—The life history of *V. inæqualis*, the cause of apple scab, is described. From the author's observations it seems that ascospore infection is largely responsible for early attacks of scab on the leaves and petioles. An examination of leaves collected during the latter part of the winter and early spring showed that the fungus was present upon them and that from them inoculations were readily made.

Life history of Melanops quercuum forma vitis, C. L. SHEAR (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 748*).—This fungus has been frequently found in the ascogenous stage on the apple and a great many other trees and shrubs but has generally been regarded as one and the same species. A variety of names have been applied to it in its different stages, and the author has conducted experiments to determine the relationship of its different phases.

The cultures first produced pycnidia of the Macrophoma or Dothiorella type, but later spores were borne closely resembling Sphæropsis. The fungus is not known at present to cause any serious injury to the grape, but the form on the apple is said to cause the black rot, leaf spot, and canker.

Parasitism of Coryneum foliicolum and Phoma mali, C. E. LEWIS (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 752*).—A brief account is given of investigations by the author which have been since published as a bulletin of the Maine Station (E. S. R., 22, p. 547).

A disease of fig trees (*Jour. Bd. Agr. [London], 17 (1910), No. 1, pp. 47–49*).—A description is given of *Libertella ulcerata*, a fungus that causes a disease of fig trees somewhat similar to that produced by the apple canker fungus (*Nectria ditissima*). This disease seems to be one that has been known for a considerable time in Great Britain, but has not been reported in other countries. The fungus should be cut away from the wood and all affected parts burned, the wounds being coated with tar.

Bacterial blight of mulberry, E. F. SMITH (*Abs. in Science, n. ser., 31 1910), No. 803, pp. 792–794*).—A study has been made of the bacterial disease of mulberries, which has been attributed to a species of Diplococcus and to *Bacterium mori*.

In 1905 the author isolated from blighting mulberry leaves two yellow organisms, but inoculation experiments failed to show that they were the cause of the trouble. In 1908 the study was continued and the bulk of the bacteria found in the fresh material proved to be a white species. Of this white organism numerous successful infections have been made and the organism reobtained. Independently two of the author's co-workers obtained similar results, and there is believed to be no doubt that the infection is due to the white organism. For this organism, which the author calls *B. mori*, an amended description is given.

Peach yellows and frost injury, M. B. WAITE (*Abs. in Science, n. ser., 31 (1910), No. 803, pp. 798, 799*).—In the author's opinion there is no relation whatever between winter injury and peach yellows, the latter being considered a contagious disease, although the causal organism has never been ascertained.

Attention is called to the fact that frost injuries have occurred from Michigan to New York and New England in the peach yellows area, that frost injury has been severe in western New York, Ohio, and Michigan without any accompanying peach yellows, and that yellows is reported without frost injury in New Jersey, Delaware, Maryland, southern Pennsylvania to Tennessee, and North Carolina.

The Central American banana blight, R. E. B. McKENNEY (*Abs. in Science, n. ser., 31 (1910), No. 802, pp. 750, 751*).—Beginning in 1904 the author made a study of the disease or blight of bananas, which seems to be spreading with considerable rapidity throughout Central America. Young and old plantations are attacked, but the disease seldom becomes evident until the shoots have reached a height of from 4 to 6 ft. The first external sign is a rapid yellowing and subsequent browning and wilting of the leaves. Eventually all the leaves die and fall back against the trunk, leaving a crop of suckers which in turn are killed and give place to still weaker shoots. The fruit of the diseased shoots rarely matures and when mature is worthless.

On cutting the pseudo-stem across, the bundles are found to be of a yellow, reddish, or reddish-purple color, the color deepening toward the rootstock. In the last stages of the disease the bundles are almost black. The juice of the diseased plants contains much less tannin than that of normal ones, and a nauseating odor is associated with the presence of the trouble. There appears to be a seasonal periodicity in the activity of the blight corresponding to the periodicity of growth in the banana plants.

The exact cause of the trouble has not been determined, but it is believed to be probably a vegetable parasite which makes its entrance into the plant through the rhizome or roots.

No method of control has been found, but the progress of the disease may be delayed by digging out and burning the diseased plants as soon as observed. It was found that the Chinese banana, now occasionally grown in Central America, is practically immune to this trouble.

A Cuban banana disease, E. F. SMITH (*Abs. in Science, n. ser., 31 (1910), No. 802, pp. 754, 755*).—The author describes a disease of bananas which was first called to his attention as occurring in Cuba. This disease is identical with or similar to the disease occurring in Central America, described by McKenney (see above), and also in northern South America. The author believes that possibly the diseases may be identical or that one may be due to bacteria and the other to fungi. The Cuban disease is attributed to a species of Fusarium, to which the name *F. cubense* n. sp. is given.

Cacao canker, J. B. CARRUTHERS (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 64, pp. 30, 31*).—A note is given on the cacao canker, which was investigated in Ceylon by the author, and a summary is presented of recent investigations by Mrs. A. E. Van Hall, which have already been noted (E. S. R., 22, p. 547).

Witches' broom disease of cacao in Surinam, J. B. RORER (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 64, pp. 32, 37*).—A condensed account of the investigations of Van Hall and Drost that have been noted elsewhere (E. S. R., 22, p. 547).

Preliminary report on cacao spraying experiments, J. B. RORER (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 64, pp. 10–14*).—A preliminary experiment having shown the possibility of controlling the cacao disease, an experiment was undertaken on a larger scale in which trees were sprayed with a 5:5:50 Bordeaux mixture. The sprayed trees bore a considerably increased number of pods over the unsprayed ones, and only 7.3 per cent of the pods from the sprayed plat were black or diseased as compared with 26.3 per cent from the control plat.

The bud rot of coconut palm, J. B. RORER (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 64, pp. 22–29*).—A brief summary of investigations on the bud rot of coconut palm is given as an introduction to a paper by J. R. Johnston on the coconut palm disease of Trinidad. In this paper different conclusions from those reported by other investigators are reached concerning the cause of this most serious disease, the author attributing the bud rot to bacteria rather than to fungus attacks.

Notes on some diseases of trees in our national forests, G. G. HEDGCOCK (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 751*).—Notes are given on the occurrence and distribution on a large number of hosts of the following wound parasites which attack forest trees: *Polyporus dryophilus*, *P. obtusus*, *P. sulphureus*, *P. schweinitzii*, *Fomes igniarius*, *F. applanatus*, *F. laricis*, *Trametes pini*, and *Echinodontium tinctorium*. In addition the author calls attention to the injury to coniferous trees by species of Razoumofskya, and *Peridermium coloradense* is noted as occurring on *Picea engelmanni* and *Peridermium elatinum* on species of Abies.

Successful inoculations are reported with uredospores of *Cronartium quercuum* on leaves of a number of species of oak, while the teleutospores of the same fungus produced galls on the twigs of young trees of *Pinus virginiana*.

The chestnut bark disease, H. METCALF (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 748*).—The author affirms the active parasitism of *Diaporthe parasitica*, having verified it by nearly 500 successful inoculations. The lesions caused by the fungus may occur on any or all parts of a tree above ground, the most common places being crotches, the base of the trunk, and the ultimate twigs. It is claimed that the parasite can enter without any visible breaks in the bark, but that wounds usually form the means of entrance. Winter injury is held to bear no relation to the bark parasite except as offering the fungus opportunity for entrance through wounds. The present range of this fungus is said to be from Saratoga County, N. Y., and Suffolk County, Mass., to Bedford County, Va., Greenbrier and Preston Counties, W. Va., and Westmoreland County, Pa.

Polystictus hirsutus as a wound parasite on mountain ash, J. B. POLLOCK (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 754*).—The occurrence of this fungus on two mountain ash trees at Ann Arbor, Mich., is reported. The observations seem to show that the fungus is not only a wound parasite, destroying the dead heart of the tree, but that it also slowly and progressively attacks the cambium, gradually killing the tree.

European currant rust on white pine in America, P. SPAULDING (*Abs. in Science, n. ser., 31 (1910), No. 802, pp. 756, 757*).—The two stages of the rust, one occurring as *Peridermium strobi* on the white pine and the other as *Cronartium ribicola* upon leaves of Ribes are described. An account is given of the introduction of the form on the white pine in seedlings imported in 1909 (E. S. R., 21, p. 748), and attention is called to the necessity for checking such importations or providing for inspection of nurseries when imported seedlings are planted.

Morphology and life history of Puccinia malvacearum, J. J. TAUBENHAUS (*Abs. in Science, n. ser., 31 (1910), No. 802, p. 747*).—After describing the morphology of the hollyhock rust, the author gives an account of its life history, particularly with reference to its hibernation.

The fungus, he finds, is carried over winter as developing mycelium, as hibernating teleutospores, and with the seeds. Late in the fall young sprouts are developed, which during the winter show evidence of infection. From infected leaves teleutospores were germinated, which produced an abundance of sporidia about the middle of the winter, proving that the fungus could be carried over

as hibernating teleutospores. An experiment with diseased seeds showed that the disease could be carried by them, and artificial inoculations proved that the fungus could be readily communicated to the common mallow (*Malva rotundifolia*).

A laboratory method of determining the fungicidal value of a spray mixture or solution, D. Reddick and E. Wallace (*Abs. in Science, n. ser., 31 (1910), No. 803, p. 798*).—"The method consists essentially of spraying slides or cover-glasses with a spray substance of a given formula. After proper drying and exposures spores of the pathogen are placed on them in a drop of meteoric water to germinate. This method more nearly simulates natural conditions than that of using a drop of the spray substance direct. Experimental data in connection with the conidia of *Venturia inæqualis* have been obtained which confirm the fact."

ENTOMOLOGY.

Twenty-fourth report of the state entomologist on the noxious and beneficial insects of the State of Illinois, S. A. Forbes (*Rpt. State Ent. Ill., 24 (1908), pp. 168+XVI, pls. 8, figs. 18*).—Most of the articles which make up this report have been previously noted as Bulletins 104, 107, 108, 112, and 116 of the Illinois Experiment Station (E. S. R., 17, p. 677; 18, pp. 160, 956; 19, p. 554).

An account is also given of the elm twig girdler (*Oberea ulmicola*), which has been the source of considerable injury to American elm, particularly at Decatur. It is stated that this beetle has lately been found infesting the cherry and in one case the peach. Attention is directed to the injury of this beetle when, between May 20 and June 15, the tips of small twigs, each bearing a few fresh leaves and cut off squarely at the base, fall from the trees. A careful examination of the stubs remaining on the tree shows a narrow encircling groove or girdle cut through the bark at 2 in. or less from the blunt end, and a small "L"-shaped slit between this girdle and the end of the stub. "Repeated injuries of this description, year after year, give the tree a scrubby and unwholesome look, and may even kill it eventually, after forcing it to put forth new twigs repeatedly, as the growth of the preceding season is destroyed."

The female lays her eggs one in a place, usually under a triangular flap of bark made by the intersection of the lines of an "L"-shaped slit. In 1903 the girdling of the trees was at its height on May 29 and has been noticed as late as June 10. The earliest date for the hatching out of the larvæ is June 13 and the latest about June 24. "The slender larva of this beetle lives within the injured twigs, which it burrows lengthwise, pushing its excrement out through small round holes made in the bark for the purpose. . . . The larvæ, in various stages of growth, hibernate in their burrows and finish their growth the following spring. . . . Pupation occurs within the burrow, in a cavity shut off in both directions by a firm plug of mingled woody fiber and excrement." The earliest date for the appearance of the pupa is April 16 and the latest is May 22. The beetle has been found to emerge as early as May 10, or a period of about 3 weeks passed in the pupal stage. "The beetles feed on the veins of the leaves, gnawing these away from the under side, thus sometimes making longitudinal slits through the thickness of the leaf." Twigs have been found in which eggs had been laid as many as 8 separate times with the usual number of girdlings in each case. "Two insect species were found at Decatur preying on the elm twig girdler, one a minute hymenopterous parasite, *Eudcrus lividus*, and the other a predaceous grub of a beetle, *Cymatodera balteata*."

In the larval or pupal stage it may be killed by trimming off and burning the infested twigs in spring at any time before the middle of May. Spraying experiments in which applications of arsenate of lead (12½ oz. of sugar of lead

and 5 oz. of arsenate of soda dissolved in 50 gal. of water and a solution double this strength) were made resulted in the preservation of 55 per cent of the twigs which would otherwise have fallen, where the weaker strength was used, and of 85 per cent where the stronger spray was applied.

Technical descriptions of the stages of the beetle accompany the account.

Twenty-fifth report of the state entomologist on the noxious and beneficial insects of the State of Illinois, S. A. FORBES (*Rpt. State Ent. Ill., 25 (1909), pp. XXIII+123, pls. 3, figs. 35*).—This report is composed of 3 papers which have previously been noted as Bulletins 130, 131 and 134 of the Illinois Experiment Station (E. S. R., 21, pp. 57, 58, 453).

Contents and index of the reports of the state entomologist of Illinois, XIII–XXIV, 1884–1908, S. A. FORBES (*[Urbana]: State Ent., 1909, pp. 157*).

Fourth annual report of the state entomologist of the State of Maine, E. F. HITCHINGS (*Ann. Rpt. State Ent. Maine, 4 (1908), pp. 70, pls. 9*).—Among the insects that were the source of injury during 1908 was the tarnished plant bug, which injured dahlia, chrysanthemum, and aster buds, as well as the buds and young fruit of the apple. The saddled prominent (*Heterocampa guttivitta*) again appeared in considerable numbers, thousands of acres of hard-wood growth in the belt extending from the New Hampshire line at Fryeburg to beyond Skowhegan, being stripped bare. Details of the gipsy-moth work are reported by E. E. Philbrook. Fifteen towns in the State are reported to have been infested in 1908. A catalogue of the land, fresh-water, and marine mollusca of Maine, by N. W. Lermond, is appended.

[Report on insects and insecticides], J. L. PHILLIPS (*Rpt. State Ent. and Plant Path. Va., 7 (1908–9), pp. 7–56, 99–113, pls. 6, figs. 13*).—The work from October 1, 1907, to September 30, 1909, is discussed in this report.

The details of nursery inspection are first presented, together with the treatment of nursery stock by fumigation. During 1909, nests of the brown-tail moth were found to have been introduced on imported nursery stock at 4 different points, about 40 nests being discovered and destroyed.

Summarized accounts are given of the more important insect pests and the remedial measures applicable. The gloomy scale is stated to be one of the most important injurious insects affecting shade trees in Virginia. The periodical cicada was observed at Fishers Hill in 1909.

Directions for the use of lime-sulphur, kerosene emulsion, and soluble oils are included in the report.

Injurious insects of the Montreal region in 1908, J. M. SWAINE (*Ann. Rpt. Quebec Soc. Protec. Plants [etc.], 1 (1908–9), pp. 17–23, figs. 5*).—A brief report on the occurrence of insect pests.

Insect pests in 1909, R. S. MACDOUGALL (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 75–90, figs. 3*).—The insects noted are the large larch saw-fly (*Nematus erichsoni*), *Chermes viridis*, *C. abietis*, *C. strobilobius*, magpie moth, currant saw-fly (*N. ribesii*), *Lochmæa suturalis*, and frit fly (*Oscinis frit*).

Report on economic zoology for the year ending April 1, 1908, F. V. THEOBALD (*Jour. Southeast. Agr. Col. Wye, 1908, No. 17, pp. 65–182, pls. 24, figs. 9*).—The arrangement of this report is similar to that of 1907 (E. S. R., 20, p. 651), the important animal pests of the year being considered under the several crops, etc., to which they were a source of injury.

Among the more important pests mentioned are the raspberry weevil (*Anthonomus rubi*), which invaded cherry plantations in Worcestershire; *Entomobrya nivalis*, which injured hops in Kent; *Argyresthia lævigatella*, which attacked larches; *Dascillus cervinus*, which injured grass in Ireland; and *Nacerdes melanura*, which was a source of damage to woodwork at Wisbech. Winter

moth larvæ (*Cheimatobia brumata*), and lackey caterpillars (*Clissiocampa neustria*), did great damage to fruit. For the last two seasons the cherry fly (*Rhagoletis cerasi*) has been received in England in large numbers in late cherries from France. The larvæ of the plum fruit moth (*Opadia funebrana*) were found in quantities in boxed French Green Gage plums.

Report upon the entomological work conducted in the district during the year 1907–8, T. F. MAIN (*Dept. Agr. Bombay, Rpt. Ent. Work, 1907–8, pp. 27*).—A brief summary is given of the present knowledge of the potato moth (probably *Lita solanella*), the injury caused by which is placed at 18 to 20 per cent of the crop. Other imported pests reported upon are white ants, the sugar-cane borer (*Chilo simplex*), bollworm, and *Nonagria uniformis*.

The apple-leaf hopper, R. L. WEBSTER (*Iowa Sta. Bul. 111, popular ed., pp. 4–12, figs. 3*).—A popular edition of Bulletin 111, previously noted (E. S. R., 23, p. 255).

The green bug and its enemies.—A study in insect parasitism, S. J. HUNTER (*Bul. Univ. Kans., 9 (1909), No. 2, pp. 1–163, pls. 3, figs. 48; rev. in Science, n. ser., 30 (1909), No. 782, pp. 927–929*).—The first part of this work is devoted to the southern grain aphis or green bug (*Toxoptera graminum*) and the work that was carried on during the outbreak of the pest in 1907. In the spring of that year it entered Kansas from the South and was the source of serious injury to small grain, due apparently to the fact that its principal parasite did not accompany it. The work of introducing parasites from field stations located in Oklahoma and southern Kansas, during the course of which more than 8,500 boxes were distributed, is considered at some length.

A general discussion of parasitism then follows, in which the author quotes freely from the writings on the subject by several entomologists. It is shown that this aphid first came to prominence in 1852 at Bologna, Italy, where it was described by Rondani. In 1884 it became of economic importance in Hungary. It was first reported from the United States in 1882, since which time it has spread throughout the grain producing States of the South. The first instance of its appearance in Kansas was in December, 1906, at which time it was found near Girard, Crawford County, by C. E. Sanborn. During the spring of 1907 it was present in every wheat growing county in the State, being most abundant in the southern part.

"In the experiments with *T. graminum* and *Macrosiphum granaria* to show the effect on wheat, it was found that on an average of 15 days the *T. graminum* killed the wheat on which they were placed, while the *M. granaria* in the same time under the same conditions inflicted only slight injury." Life-history studies are considered at some length. "During summer temperature in the experimental laboratory the average length of life, based on continuous observation, from birth to death, of 15 green bugs, was 35.22 days; average number of offspring, 55.42; average period of reproduction, 22.74 days; average number reproduced daily during reproductive period, 2.43; age at which reproduction begins, 7.1 days; number of molts, 4. This data was corroborated in an observation upon 54 green bugs selected at various ages and kept under similar conditions. The rate of reproduction in the winged form appears to be about the same as in the wingless form. . . . During January and February, mean temperature 35° F., average daily number of young for each individual during the reproductive period was 0.374; during March and April, mean temperature 58°, 1.5 during the reproductive period. Laboratory experiments from January to May, mean temperature 62.32°, gave results corresponding to those of summer temperatures in the field and laboratory. The lowest temperature at which offspring appeared was during a day recorded maximum

36° and minimum 4°. Under artificial conditions offspring were reproduced during a day of temperature 65° to 103°."

The principal insect enemies of the green bug are syrphus flies, the aphis lion, ladybird beetle, and the parasite *Lysiphlebus tritici*. Studies of *L. tritici* are summarized as follows: "In laboratory experiments the maximum number of green bugs parasitized by a single individual was 95; average number, 38; length of life in laboratory, 3 to 6 days; minimum period of development in laboratory, 7 days. The ratio of male to female parasites is 34:65. Lysiphlebus is also parthenogenetic, the offspring being almost entirely composed of males. Only one parasite develops in the body of the host. The lowest temperature at which Lysiphlebus was observed attempting to oviposit was 35° F. The antennæ of the female vary from 12 to 13 joints and of the male from 14 to 15 joints. Five parthenogenetic males had 16-jointed antennæ. In the laboratory breeding cages Lysiphlebus parasitized a small percentage of *M. granaria* and would parasitize more freely *Siphocoryne avenæ*, but would not parasitize *M. trifolii* or *M. chrysanthemicolen* or *Chaitophorus negundinis*. From field observation, however, it appears that Lysiphlebus does not perpetuate itself and maintain a general distribution on these other hosts."

The author concludes that the green bug distributes itself more rapidly than the parasite, succeeds in existing and increasing in unusual numbers free from the parasite, and that parasites when transported and introduced into areas previously free from the parasite become active in the reduction of the green bug. In view of these facts he considers the artificial distribution of the parasite at such times to be a practical means for controlling the green bug.

The review is by C. W. Woodworth of the California Station.

The green bug and its natural enemies, S. J. HUNTER (*Science, n. ser., 31 (1910), No. 788, pp. 190–192*).—A reply to the review of the above article.

The influence of climate upon the green bug and its parasite, P. A. GLENN (*Bul. Univ. Kans., 9 (1909), No. 2, pp. 165–200, figs. 18*).—The main factors, chiefly climatic conditions, that enter in to regulate the abundance of the green bug in this country have been studied and are discussed in connection with temperature charts.

The author finds that the green bug can not endure the high temperatures which prevail in summer, or the low temperatures which prevail in winter in most of the grain-growing sections. "For this reason it is confined to the temperate zone, and chiefly to those regions bordering on large bodies of water, where the great extremes in summer and winter do not occur, rather than to inland regions."

The parasite of the green bug (*Lysiphlebus tritici*) becomes inactive when the temperature falls below 35 or 36° F. and remains motionless on the blade of wheat or on some other object "until the temperature falls to the minimum limit of their endurance, which is about 17°, and then fall to the ground dead, or until the temperature rises to 35° or above, when they become active again. From 35 to 40° they are only feebly active, but have been observed to sting bugs at 38 and 40° and to try in a very feeble way to sting bugs at 35° F., but apparently without success. As the temperature rises above 45° F. their activity increases, and appears to be about normal at 70°. At temperatures higher than that they show a greater tendency to take flight and a less tendency to seek for bugs for the purpose of stinging them. Their normal method of passing the winter is in the pupa state, and they can probably survive very severe winters. . . . From 61 experiments the following results were obtained: The development period at 35° is from 114 to 140 days; from 55 to 60°, 28.4 days; from 60 to 65°, 16.06 days; from 65 to 70°, 13.07 days; from 70 to 72°, 11 days. In these experiments the minimum time noted was 7 days." When

the mean temperature falls below 55° the parasites do not multiply rapidly because it requires nearly a month or even more for them to develop. During the hot months of July and August they decrease in numbers because of a lack of hosts, since the green bugs can not endure temperatures much above 100°.

A synopsis of the genus Pemphigus with notes on their economic importance, life history, and geographical distribution, C. F. Jackson (*Jour. Columbus Hort. Soc., 21 (1907), pp. 160-218, figs. 3*).—Twenty-three species of Pemphigus are described as occurring in America.

Plant bugs injurious to cotton bolls, A. W. Morrill (*U. S. Dept. Agr., Bur. Ent. Bul. 86, pp. 110, pls. 5, figs. 25*).—The first part of this bulletin is devoted to a general consideration of the nature and amount of damage that the true bugs do to cotton and the part they take in the dissemination of plant diseases. Because of the fact that when dry the damaged boll gives by itself no direct evidence of the cause of its condition, the importance of plant bugs as cotton pests has been almost completely ignored. Although no spotting of the bolls is known to result directly from the attacks of the representatives of the heteropterous families thus far studied, the bolls, even when as large as 1½ in. in diameter, may, when severely attacked by plant bugs, flare, turn yellowish, become flaccid, and finally fall to the ground. The most essential factor in determining injury to the bolls is the appearance of the inner side of the carpels, where the point of entrance of the insect's setæ is marked by a minute dark spot surrounded by a watery, or blisterlike, bright green area, contrasting distinctly with the light, dull-greenish background. An examination of 100 injured bolls, revealing over 4,000 punctures by plant bugs (practically all by *Pentatoma ligata*), developed the fact that 34 per cent of the punctures had resulted in proliferation. In general, bolls damaged by plant bugs when open are characterized by more or less shriveled locks and only partial spreading of the carpels. In addition to destroying the bolls, many of the plant bugs cause more or less staining of the fiber and thus reduce the quality.

Investigations of the conchuela (*Pentatoma ligata*) of which preliminary accounts by the author have been previously noted (E. S. R., 17, p. 782; 18, p. 952) are reported upon at length. Detailed accounts of its life history and habits, technical descriptions of its several stages, destructiveness, natural and artificial control, etc., are given. In Mexico the grain bug (*P. sayi*) has been observed to be of frequent occurrence on cotton and to resemble the conchuela in habits, life history, and seasonal history. It is thought that the preference of this species for the seed of grains and alfalfa will be sufficient protection against its occurring in injurious abundance in cotton fields in this country. The brown cotton bug (*Euschistus servus*) which occurs throughout the Southern States has been observed in limited areas comprising only a few acres each in numbers which caused destruction of the majority of the cotton bolls. As many as 162 eggs were observed to be deposited by a single specimen. "At an average daily mean temperature of 78.9° F., the average incubation period of 5 batches of eggs was found to be 4 days and 17 hours. The duration of the nymphal stages corresponds closely with that of the conchuela." *Telenomus ashmeadi* parasitizes its eggs. The green soldier bug (*Nezara hilaris*) is the most common pentatomid found on cotton throughout the Southern States. Although a very general feeder, it shows a preference for cotton bolls. *N. viridula* which occurs throughout the cotton belt injures cotton bolls as well as potatoes, sweet potatoes, oranges, etc. *Thyanta custator* is one of the most common pentatomid bugs in Texas. In selecting food plants, it has thus far exhibited a preference for grains and cotton. In the laboratory *T. ashmeadi* has been reared from the eggs of this species and egg-batches have been collected in the field from which parasites had emerged. Other pentatomids mentioned

as frequenting or attacking cotton are: *Murgantia histrionica, Podisus maculiventris, P. acutissimus, Proxys punctulatus,* and *Stiretrus anchorago.* Three species of leaf-footed plant bugs, *Leptoglossus phyllopus, L. oppositus,* and *L. zonatus* are mentioned as attacking cotton bolls, the first named being the one most commonly found in cotton fields. The natural enemies of coreids destructive to cotton mentioned are 2 egg parasites, *Hadronotus anasæ* and *Acanthocephala (Metapodius) femorata,* and a tachinid fly (*Trichopoda pennipes*). Thus far the only species of the family Capsidæ which has proved itself important as a cotton pest is the cotton leaf-bug (*Calocoris rapidus*). Lygæids mentioned as injuring cotton are *Nysius angustatus, Oncopeltus fasciatus,* and *Lygæus turcicus.* Two pyrrhocorids, the bordered plant bug (*Largus succinctus*) and the cotton stainer are also briefly considered.

The cultural methods of controlling the boll weevil, especially the destruction in the fall of all cotton plants in the field, are in part of importance in the control of plant bugs. "Associated with these methods, and probably of equal importance, is the practice of destroying early in the season wild food plants of the plant bugs which attack cotton, thus checking the multiplication of the insects which later turn their attention to the cotton bolls. . . . Under certain circumstances contact insecticides may be of use against plant bugs in cotton fields, but only when they occur in such excessive abundance that all methods of collecting are impractical. Kerosene emulsion will probably prove the most effective spray, but before using on a large scale preliminary tests should be made to determine the required strength." Good results are said to have been obtained from hand picking the conchuela and the cotton stainer.

Report of entomologist, E. W. Berger (*Florida Sta. Rpt. 1909, pp. XXXV–XLV, fig. 1*).—In the investigation of citrus white flies, *Aleyrodes nubifera* was found to occur in several localities not previously noted; up to the present time it has only been found on citrus. During the year several food plants of *A. citri* were discovered, namely, green ash (*Fraxinus lanceolatus*), wild olive (*Osmanthus americanus*), and button bush (*Cephalanthus occidentalis*). *A. citri* was found on a leaf of Onshu orange received from the Province of Nagasaki, Japan, a number of white fly larvæ upon the leaf being infected with red Aschersonia (*A. aleyrodis*). From a communication accompanying the leaf it was learned that the white fly has not been found in orange groves outside of Nagasaki and Kiushiu. Dried larvæ and pupa cases of *A. citri* were found on citrus leaves received from Saharanpur, India, some 6 years previous.

What appears to be another fungus disease of the white fly (*Sporotrichum* sp.) was observed during the year. This fungus was found in a grove near Gainesville and later at Orlando, occurring mainly on adult white flies, but also on larvæ. Two attempts to introduce the yellow fungus and the brown fungus on *A. citri* were made at Gainesville. The author concludes that the yellow fungus is not a natural disease of *A. citri* but of *A. nubifera,* upon which it is thriving in several parts of the State. Field experiments and observations of fungi are reported in detail. Analysis of honeydew of *A. citri* shows an average of 7 per cent glucose and 24 per cent sucrose for the dried residue. A number of specimens of Manatee snail (*Bulimulus dormani*) were received from Plymouth, where they were found cleaning off the sooty mold fungus from stems, leaves, and fruit.

Gold-dust and several other soaps were tested as spraying mixtures. It is concluded that any good contact insecticide will be effective against white fly larvæ in the spring and summer, even when diluted sufficiently so as not to injure trees or fruit. It is best to spray when the greatest number of larvæ are in the first to third and flat early fourth stages, which condition exists in

April or May, beginning about 10 days or 2 weeks after the spring brood of adults has quite disappeared. Summer spraying for white fly can be practiced whenever the trees need relief, but the periods when the adult white flies are swarming in greatest number should be avoided.

Catalogue of the neartic Hemiptera-Heteroptera, N. BANKS (*Philadelphia, 1910, pp. 103+VIII*).—The 30 families listed represent 1,268 species. The family Capsidæ is represented by 348 species, Lygæidæ by 160, Pentatomidæ by 149, and Coreidæ by 108.

Gipsy and brown-tail moth suppression, F. W. RANE (*Ann. Rpt. State Forester Mass., 6 (1909), pp. 67–109, pls. 5, fig. 1*).—During 1909, the maximum number of men engaged in the work at any one time was 2,750, with 150 large power outfits in operation and 200 hand outfits. The known spread of the gipsy moth is said to have been very slight, although new infestations were found in Hopedale, Lancaster, Mendon, and Northborough. The total area in Massachusetts known to be infested at the end of the year comprised some 3,950 square miles. During the season 7,776 acres were sprayed, using 300 tons of arsenate of lead, and 698,597 burlaps and 26,313 tangle-foot bands were placed on trees, A nozzle that will carry the stream much higher than any used previously was invented for use in woodland.

Investigations of the diseases of the two moths were continued. The work with insect parasites is said to show very satisfactory progress. Information furnished by W. F. Fiske is given on five of the more important imported parasites, namely, *Anastatus bifasciatus*, *Schedius kuvanæ*, *Glyptapanteles fulvipes*, *Blepharipa scutellata*, and *Monodontomerus æreus*. The importation and breeding of the predaceous beetle (*Calosoma sycophanta*) was continued with good results, 33 colonies being planted during the year. A brief report on the introduction of parasites by Dr. L. O. Howard of this Department, under whose direction the work is carried on, is incorporated in the author's report.

The codling moth, C. P. VAN DER MERWE (*Dept. Agr. Orange River Colony Bul. 20, pp. 14, figs. 7*).—This is a summarized account of the codling moth with remedial measures. The pest is said to be continually spreading into uninfested territory in the Orange River Colony.

Papers on cereal and forage insects. The New Mexico range caterpillar, C. N. AINSLIE (*U. S. Dept. Agr., Bur. Ent. Bul. 85, pt. 5, pp. 59–96, pls. 2, figs. 22*).—The details of a study made of the range caterpillar (*Hemileuca oliviæ*) in northeastern New Mexico during the adult period of the insect in 1908 and the entire active life period of 1909 are here reported.

The injury by the caterpillar is due, not only to its eating grama, buffalo and other grasses down to the roots but to the trail of silk which it leaves everywhere, especially during the molting season. The area at present infested is known to extend from just north of Las Vegas, N. Mex., on the south, to Las Animas, Colo., on the north, and from Cimarron and Koehler, N. Mex., on the west, to points well within the Texas "Panhandle" on the east. This area, about 30,000 square miles, is infested very unevenly as yet, but with the insect more or less prevalent everywhere. The species was first described by Prof. T. D. A. Cockerell, some 12 years ago, from a male collected at Santa Fé, N. Mex., and is now known to occur also in Texas, Oklahoma, and Colorado. Technical descriptions of the several stages, including the 5 larval, prepared by Dr. H. G. Dyar are presented with illustrations.

The life history and habits of the moth have been carefully worked out and are described in detail. Oviposition commences about October 1, dissections of females showing that as many as 162 eggs may be deposited. It is the habit of the moth to deposit the eggs about a weed or grass stem within an inch or two from the ground, about 2 hours being required under favorable circumstances

for the operation. In 1908, the first larvæ were noted about the middle of June; in 1909, they began to emerge about May 20 and continued to appear until after July 1. For several days after hatching the young caterpillars remain massed about the remains of the eggs, feeding occasionally on the empty shells. The processional habit is persisted in until the third larval instar. "Observations made in the open appear to show that the first 3 instars are passed in rapid succession, each one lasting less than 2 weeks. The fourth instar is longer, while the fifth is indefinitely long, averaging at least 4 weeks."

The author finds that they eat nothing but grass, and only the native grasses. Individuals placed upon timothy, blue grass, and various grains, wheat, oats, and barley, refused them entirely. A list is given of 13 species of Graminae upon which they were found feeding. The earliest date that the caterpillar has been observed to spin up is August 18. "Where weeds are not available for pupation, clumps of grass are used, their stems being often drawn together by a mass of webs until they resemble in shape an Indian tepee. When both weeds and grass stems are wanting, the larvæ burrow under the short grass close to the ground and draw the blades together for what little protection they will afford."

The duration of the pupal stage was found to be from 5 to 8 weeks and even longer, varying under similar conditions. In 1909, the first adults to emerge were observed on October 1. They continue to appear until the middle of November, unless as in 1909, the cold and snow puts an earlier stop to their emergence. It is said that the life of the individual moth rarely if ever exceeds 3 days.

In order to determine the percentage of parasitism, 5,000 pupæ were collected during September, 1909, and dissected. Of these 56.4 per cent were found to be males and 43.5 per cent females, 95 per cent being alive and 5 per cent dead, and only 30, or 0.6 per cent being parasitized. The parasites found were *Pimpla conquisitor* (1), *P. sanguinipes* (8), *Chalcis ovata* (12), *Tachina mella* (6), and unclassified hymenoptera (3). Other enemies discovered were robber flies (*Stenopogon picticornis* which feeds upon the caterpillars and *Erax varipes* which captures the moth), and a small mite (*Rhyncholophus* sp.) which occurs at times on larvæ. An ant, *Monomorium minutum minimum*, found in pupal shells is supposed to be a scavenger. Robins were observed carrying caterpillars away and occasionally feeding upon them.

Remedial measures considered include burning of the range, introduction of natural enemies, and rolling the ground. It is said that at the time the infestation is most severe there is usually insufficient grass remaining to support a running fire. "An experiment in this line was tried in the spring of 1909 and a large area in a wild pasture near Koehler was burned over. Within this burned area, later in the season, the number of caterpillars equaled those of the surrounding unburned parts of the same pasture." The author is of the opinion that at the present time burning the range would be only a temporary and local expedient. The most serious objection to any scheme of destruction that involves either labor or expense is found in the extremely small value per acre of the grass crop, the land renting from 2 to 5 cents per acre for the year's pasturage.

Catalogus dipterorum, C. Kertész (*Catalogus dipterorum. Budapest, 1910, vol. 7, pp. 470*).—In this volume the Syrphidæ, Dorylaidæ, Phoridæ, and Clythiidæ are listed. For the preceding volumes, see a previous note (E. S. R., 22, p. 656).

A catalogue of the Coleoptera (*Coleopterorum Catalogus. Berlin, 1910, pts. 5, pp. 31; 6, pp. 81; 7, pp. 57; 8, pp. 70; 9, pp. 68; 10, pp. 10; 11, pp. 40; 12, pp. 68; 13, pp. 21; 14, pp. 25; 15, pp. 166*).—A continuation of the catalogue

previously noted (E. S. R., 22, p. 756). Part 5, by R. Gestro, takes up the Cupedidæ and Paussidæ; part 6, by H. Wagner, the curculionid subfamily Apioninæ; part 7, by H. von Schönfeldt, the Brenthidæ; part 8, by G. Van Roon, the Lucanidæ; part 9, by E. Olivier, the Lampyridæ, and part 10, by the same author, the Rhagophthalmidæ and Drilidæ; part 11, by A. Léveillé, the Temnochilidæ; parts 12 and 13, by E. Csiki, the Endomychidæ and Scaphidiidæ, respectively; part 14, by M. Pic, the Hylophilidæ; and part 15, by H. Gebien, the Tenebrionidæ, I.

A monographic revision of the twisted winged insects comprising the order Strepsiptera Kirby, W. D. PIERCE (*U. S. Nat. Mus. Bul. 66, pp. XII + 232, pls. 15, figs. 3, map 1; rev. in Jour. Econ. Ent., 3 (1910), No. 2, pp. 252, 253*).—The author is unable to accept the view that these parasitic insects are modified representatives of the Coleoptera. He regards them as forming a separate order on a distinct line of descent from that of the Coleoptera and nearer the Hymenoptera and Diptera and as highly specialized as the highest insects in any of the orders. Four superfamilies, 37 genera, and 109 species are described. In the large list of host species at least 28 that are injurious are recorded. A glossary of terms, and an extensive bibliography are included in the work, which is richly illustrated by pen drawings and photographs.

The review is by W. M. Wheeler.

Studies of the Ixodoidea of Brazil, C. J. ROHR (*Estudos sobre Ixódidas do Brasil. Rio de Janeiro, 1909, pp. 220, pls. 6, figs. 30*).—Following a brief introduction the author takes up the external and internal anatomy of ticks, both gross and microscopic. He next presents an account of their biology and reports the details of an extensive study of 6 of the species which occur in Brazil (*Argas miniatus, Margaropus annulatus microplus, Hæmaphysalis proxima, Amblyomma cajennense, A. göldii,* and *A. varium*). The classification is then dealt with, 45 species being listed as occurring in that country. The geographical distribution and hosts of these species are shown in tabular form and a bibliography is appended.

New North American Acarina, H. E. EWING (*Trans. Acad. Sci. St. Louis, 18 (1909), No. 5, pp. 53–77, pls. 4*).—In this paper 32 species are described, which are distributed in 14 genera and 7 families.

A systematic and biological study of the Acarina of Illinois, H. E. EWING (*Univ. Ill., Univ. Studies, 3 (1909), No. 6, pp. 120, pls. 9, figs. 6*).—Although this work is intended to be of value chiefly to the acarologist because of its systematic nature, some space has been given to the biology of the group, which may be of interest or value to the entomologist. Two chapters are also devoted to the explanation of the methods of collection and preservation of specimens.

Methods of controlling tobacco insects, A. C. MORGAN (*U. S. Dept. Agr., Bur. Ent. Circ. 123, pp. 17, figs. 11*).—This circular, in which the author gives directions for the control of several important insect pests of tobacco, contains information in addition to that presented in the paper previously noted (E. S. R., 21, p. 155). The recommendations made are based upon investigations conducted since July, 1907, in the dark tobacco districts of Kentucky and Tennessee in cooperation with the Tennessee Station.

For the control of cutworms where tobacco follows a clover sod, it is again recommended that the sod be plowed under in the fall or winter and kept free from vegetation by disking or harrowing. When sod land is plowed only a short time before setting the tobacco a trap bait may be used to rid the field of the worms. In 1908 cutworms in plant beds were controlled by spraying with arsenate of lead.

The injury by the tobacco flea beetle in Tennessee and Kentucky in 1907 is estimated at $2,000,000. In these States the beetles begin to emerge from

hibernation in March, generally about the time the young tobacco plants are appearing in the plant bed. The remedial measures described are similar to those recommended in the previous account.

Life history and seasonal history notes are given on the southern tobacco hornworm (*Phlegethontius sexta*).

The tobacco moths begin to emerge from hibernation about June 1 and a few days later commence to oviposit. The emergence of the moths continues until the middle of August or later, a large percentage of the moths issuing after midsummer. The larvæ hatch out in about 4 days and pass through 5 stages in the following 19 or 20 days, at the end of which time they enter the soil to a depth of from 3 to 6 in. and pupate. "Those that pupate not later than the last week of July will emerge in about 3 weeks as adult moths of the second generation, and will commence depositing eggs in 3 or 4 days. Those that pupate after August 10 will usually hibernate, and will not emerge as adult moths until the following year. It is not until the third stage of growth, that is, about 10 to 12 days after the eggs are deposited, that the larvæ injure tobacco seriously. In the fourth and fifth stages one larva will ruin a small leaf of tobacco in a single day."

Remedial measures for the hornworm are discussed at some length, and summarized as follows: "Fall plowing of land that was in tobacco during the year will destroy more than half of the hibernating generation and will thereby reduce proportionately the number of tobacco worms that will appear the next year late in July and in August. Poison worms upon tobacco plants by dusting with Paris green. Poison tobacco moths by placing a few drops of arsenid of cobalt (flystone) solution in 'jimson' blooms."

These measures are also considered as applicable to the northern hornworm (*P. quinquemaculata*).

Insect enemies [of the apple and pear], R. I. SMITH (*North Carolina Sta. Bul. 206, pp. 45–86, figs. 17*).—Summarized accounts are given of the more important insect enemies of the apple and pear in North Carolina, together with the remedial measures applicable.

Waste and reduction of timber supplies caused by insects, and methods of prevention and control, A. D. HOPKINS (*Nat. Conserv. Com. Rpt., 1909, vol. 2, pp. 469–497*).—Substantially noted from another source (E. S. R., 22, p. 260).

Farm management for controlling field crop insects, A. F. CONRADI (*South Carolina Sta. Bul. 150, pp. 3–8*).—A brief discussion of the application of farm practice, especially crop rotation, to the control of insect pests of field crops.

Common insecticides and fungicides with directions for the treatment of farm pests, H. GARMAN (*Kentucky Sta. Bul. 147, pp. 3–39, pls. 11*).—This gives an account of the common insecticides and fungicides with directions for their use in combating insects and fungus diseases.

Spraying, F. CRANEFIELD (*Wis. State Hort. Soc. Bul. 19, pp. 24, figs. 15*).—This bulletin contains directions for the preparation and application of insecticides and fungicides.

Insecticides and fungicides, A. B. CORDLEY (*Oregon Sta. Bul. 108, pp. 20*).—This bulletin, a revision of Bulletin 75 (E. S. R., 14, p. 1099), gives brief directions for the preparation and use of insecticides and fungicides.

Insecticides, C. E. BRADLEY (*Oregon Sta. Bul. 107, pp. 12–16*).—Analyses made of insecticides, including Paris green, white arsenic, pear blight remedy, copper sulphate, and lead arsenates are briefly reported. A sample of iron arsenate analyzed showed a moisture content of 84.25 per cent, arsenic oxid 7.37 per cent, and iron oxid 5.51 per cent.

Arsenate of lead, A. McGILL (*Lab. Inland Rev. Dept. Canada Bul. 205, pp. 7*).—A report dealing with 26 samples purchased as arsenate of lead of which only 18 were true to name.

Economic and efficient hydrocyanic acid gas fumigation, R. S. WOGLUM (*Rural Californian, 34 (1910), No. 3, pp. 82–88, figs. 2*).—An address in which the practical results of fumigation investigations carried on in California are discussed.

Proceedings of the thirtieth annual convention of the Colorado State Bee Keepers' Association (*Ann. Rpt. Bd. Hort. Colo., 1909, pp. 151–175*).—A report of the proceedings.

Annual report of the Bee Keepers' Association of the Province of Ontario, 1909 (*Ann. Rpt. Bee Keepers' Assoc. Ontario, 1909, pp. 64*).—A report of the proceedings.

Directions for collecting and preserving insects, N. BANKS (*U. S. Nat. Mus. Bul. 67, pp. 135, pl. 1, figs. 188*).—An entirely new paper of particular interest to entomological students.

FOODS—HUMAN NUTRITION.

Wheat and flour investigations (crops of 1906–7), R. W. THATCHER (*Washington Sta. Bul. 91, pp. 3–31*).—Continuing earlier work, analyses and milling tests are reported of a large number of samples of wheat of different varieties grown in 1906–7 and the results discussed in comparison with similar data previously reported for the crop of 1905 (E. S. R., 19, p. 964).

In general, the results show that the whole crop for 1907 was lower in protein or gluten-producing material than the crop of 1906, the differences being undoubtedly due to the cool, moist, cloudy weather during the harvest season of 1907 as compared with the hot, dry harvest months of the previous year.

"It appears from the analytical figures already obtained in this study, and from similar results obtained by other investigators, that the chief, if not sole factor in determining the comparative chemical composition of wheat of the same variety grown in different localities is the climatic conditions during harvest, and that differences in the composition of the soil have very little, if any, effect upon the quality of the grain, except in so far as the soil affects the moisture supply of the plant. In comparisons between different varieties, the tendency of each variety to produce grain of a certain quality must, of course, be taken into account. But varietal differences seem to be less marked than differences within the same variety caused by variations in the climatic conditions under which the grain is ripened.

"Investigations are in progress at this station to determine the effect of each of the several factors which go to make up climatic influence, such as relative temperature, cloudy weather or direct sunshine, humidity of the air, moisture supply in the soil or rainfall, etc., upon the composition of the wheat; and also the stage of the plant's development at which these influences exert the strongest effect upon the quality of the ripe grain."

The composition of Indian rice, D. HOOPER (*Agr. Ledger, 1908–9, No. 5 (Veg. Prod. Ser., No. 110), pp. 63–109*).—Analyses of 159 samples of Indian rice are reported.

Considering the rice from different localities, the smallest average protein content, 6.58 per cent, was noted with Cuttack rice, and the highest, 7.69 per cent, with Bombay rice, the average value for all the varieties being 7.25 per cent. Considering individual analyses, the percentage of protein varied from 5.44 in a sample of Cuttack to 9.81 in a sample of Broach.

"One object in conducting these examinations has been to discover what natural circumstances have contributed to the superiority of the composition of the grain. It has been seen that in some cases the local reputation and

market value of the rice coincide with the high nitrogen content. . . . In other cases there is no connection between the high market value and the nitrogen contents as instanced in the dadkhani rice of Bengal. The examination has resulted in giving a prominent place to certain rices which deserve attention at the hands of cultivators. . . .

"The richness of the grain appears to be due not so much to the races of the plant or the appearance of the grain as to the cultivation. The grain of finest composition is found in plants grown in rich virgin soil or in lands liberally manured. . . . Attention to the cultivation of the rice plants in the way of manuring the land appears to be one of the principal means of improving the quality of the grain for commercial and edible purposes."

The use of monkey-bread fruit (mbuyu) as food material, L. BERNEGAU (*Pflanzer, 6 (1910), No. 5, pp. 71, 72*).—The author states that in the preparation of food products favorable results were obtained in an experimental study of the use of the dry flesh of this fruit, the rind of which is used for paper making.

[Dietetic preparations from milk] (*Brit. Med. Jour., 1910, No. 2577, p. 1242*).—Analytical and other data are reported regarding a milk albumin preparation for infant feeding and a product marketed in the form of a dry powder, miscible with water, said to be a combination of milk, malt, and eggs with sodium glycerol phosphate.

The soy bean as an article of diet for infants, J. RUHRÄH (*Jour. Amer. Med. Assoc., 54 (1910), No. 21, pp. 1664, 1665*).—In this contribution to the experimental study of the soy bean as a food product the author reports an analysis of soy-bean flour and discusses its use in infant feeding. Directions are given for the use of this material in making gruels, broths, and muffins. Attention is especially directed to the high proportion of protein, fat, and mineral matter in soy-bean flour in comparison with the relatively low carbohydrate content and the absence of starch.

Breakfast and general foods (*Brit. Med. Jour., 1910, No. 2577, pp. 1239–1242*).—Analyses are reported of a number of cereal breakfast foods, gluten meal, and patent or proprietary foods, the analytical data being supplemented by results of microscopical examination.

Food inspection decisions (*U. S. Dept. Agr., Food Insp. Decisions 122, p. 1; 123, pp. 2*).—These decisions have to do respectively with the labeling of port and sherry wines produced in the United States and with the labeling of rices.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 324–325, pp. 2 each; 326, pp. 5; 327–328, pp. 2 each; 329–330, p. 1 each; 333, p. 1; 337, pp. 2; 339, pp. 2; 340, p. 1; 342–343, pp. 2 each; 345–346, pp. 2 each; 348–349, p. 1 each; 350, pp. 7; 352–365, p. 1 each; 366, pp. 2; 367–369, p. 1 each; 371, pp. 2; 372–377, p. 1 each; 380, p. 1; 382, pp. 47*).—These notices of judgment have to do with the adulteration of rye flour, desiccated egg product, raisins and evaporated apples, peanuts, and a frozen egg product; the misbranding of sirup, drugs, alleged headache cures, canned apricots, laudanum, canned corn, a food ("concreta butterol"), olive oil, whisky, honey, coffee, currants, witch-hazel, corn meal, baking powder, canned fish, canned tomatoes, cherry sirup, vinegar, flour, water, blended maple sirup, and strawberry extract; the adulteration and misbranding of sirup, "celery cola," fruit sirups, turpentine, flavoring extracts, and olive oil; and adulterated and misbranded bleached flour.

The last mentioned paper includes the testimony of a considerable number of experts regarding the effect of oxids of nitrogen and reasons for supposing that the treatment of flour with these oxids might prove harmful, and similar data.

Misbranding vinegar (*U. S. Dept. Agr., Notice of Judgment 195, Sup., p. 1*).—This corrects the erroneous statement that the vinegar under consideration was

alleged to be adulterated and misbranded whereas it was charged that it was misbranded only.

[Food and living conditions in an English country village], MAUDE F. DAVIES (In *Life in an English Village. London and Leipsic, 1909, pp. 151–154, 192–255*).—In connection with an extended sociological study of a small English village in an agricultural region much information is given regarding the market-gardening and other agricultural conditions, and detailed data regarding the housing and living of the families, including budgets of household expenses and the kinds and cost of food eaten. Full reports were obtained of 162 households and school reports of 7 more.

"The produce of the garden furnishes a large proportion of the food of the people. Potatoes, onions, greens, and other vegetables figure largely in the menu of the poorest households, especially those with many children. Bacon is almost universally eaten. Meat is eaten in all but the very poorest houses at least once or twice a week, and it is an article of daily consumption in the majority of cottages."

In some of the families the income was insufficient for maintenance. "Not only is the quantity of nourishing food obtainable by these families inadequate, but the inevitable monotony of the diet is extremly trying, especially when any member of the family is in poor health and not enjoying a good appetite. . . .

"Probably a few of the very poorest old people, paupers, and others live almost entirely on bread and butter and tea."

On the whole, however, it is the author's opinion that the families have a fairly generous diet, and that "the majority of households in the parish can afford to feed in this manner, the exceptions being laborers with several children, and others who for one reason or another are in primary poverty."

A careful study was made of school children with respect especially to their characteristics and abilities in comparison with the family income and living conditions. In the author's opinion the recorded data "show emphatically that the dullness and deficiency of the children, even in a rural district where every advantage of good air and healthy surroundings is obtained, is mainly due to malnutrition; for though a certain proportion of dullness is found in all or most classes, whether well fed or otherwise, the greatly larger percentage among the children of the very poor, even where the parents are in every respect satisfactory, can hardly be due .o any other cause."

The food supply [of the Pima Indians], F. RUSSELL (*Ann. Rpt. Bur. Amer. Ethnol., 26 (1904–5), pp. 66–92, figs. 7*).—The food used by the Pima Indians, including both wild and cultivated plants and domestic and wild animals, is described, and methods of preparing it and other living conditions are considered. Information is supplied regarding medicinal plants. An account is also given of Pima agriculture which is largely dependent upon irrigation, the discussion as a whole constituting a part of an exhaustive study of this Indian tribe of southern Arizona.

"The Pimas subsist upon a mixed diet in which vegetable food predominates. In the past it would seem probable that the proportion of meat was greater than at present, though they have long been tillers of the soil. . . .

"Very few articles of Pima diet are eaten raw, and many of them are of such a nature as to necessitate thorough cooking; thus the agave and the fruit of some of the cacti are baked for many hours."

Formerly corn was the principal cereal food, but in recent years at least has been "of less value to the Pimas than wheat." Cotton seed is mentioned as one of the foodstuffs formerly used by these Indians.

Horses, cattle, and poultry are included among the Pima's domestic animals.

The commissary department in naval hospitals, P. A. LOVERING (*U. S. Naval Med. Bul.*, *4* (*1910*), *No. 2*, *pp. 135–143*).—The author discusses the problems which must be solved in supplying an adequate and satisfactory diet in naval hospitals, and recommends the organization of a training school for the personnel of the commissary staff. The article as a whole contains data on general problems of institution management with special reference to the preparation of food and other questions of dietetics.

Suggestions for diet kitchen equipment, S. WIERZBICKI (*U. S. Naval Med. Bul. 4* (*1910*), No. *2*, *pp. 161–163*, *dgms. 2*).—It is pointed out that a kitchen from which regular meals are to be distributed and in which light food can be prepared for patients and cooking done by a nurse for patients requiring nourishment between regular meal hours must also serve as a place where staple articles for preparation of light diets are kept and where ice is on hand for ward uses. The author describes in detail the equipment which has been planned to meet these requirements for the men's infirmary diet kitchen at the United States Naval Hospital at Las Animas, Colo.

The influence of lecithin upon metabolism, S. YOSHIMOTO (*Ztschr. Physiol. Chem.*, *64* (*1910*), *No. 5–6*, *pp. 464–478*).—The author studied the retention of nitrogen and phosphorus in periods in which lecithin preparations were fed as compared with data obtained in control periods. The tests were made with a dog as subject.

The after-effects of severe muscular work on metabolism, A. JAQUET (*Arch. Expt. Path. u. Pharmakol.*, *62* (*1910*), *No. 4–5*, *pp. 341–356*).—The special question which the author studied was the effect of muscular work at high altitude as shown by the changes in the respiratory quotient and by the metabolism of nitrogen. The mineral constituents of the urine were also taken into account.

Respiration calorimeters for studying the respiratory exchange and energy transformations of man, F. G. BENEDICT and T. M. CARPENTER (*Carnegie Inst. Washington Pub. 123*, *pp. VII+102*, *pls. 5*, *figs. 25*).—The respiration calorimeters in use at the Nutrition Research Laboratory of the Carnegie Institution are described in detail. A general plan is given of the calorimeter laboratory, the principles involved in the construction of the calorimeter considered, descriptions of the different parts of the apparatus given, and the calculation of results explained. The descriptions are illustrated with diagrams and reproductions of photographs, and to make the matter plain an account is also given of the routine of an experiment with a man as subject.

Control tests of a respiration calorimeter, F. G. BENEDICT, J. A. RICHE, and L. E. EMMES (*Amer. Jour. Physiol.*, *26* (*1910*), *No. 1*, *pp. 1–14*).—Experiments designed to show the accuracy of the respiration calorimeter are reported.

According to the authors, "the final test of the apparatus, . . . is to burn in the chamber such small quantities of alcohol as will yield amounts of water, carbon dioxid, and heat approximating the amounts eliminated by man in periods as short as one hour when at rest inside the chamber. By means of the calorimetric and chemical features of the apparatus, measurements can be made of the total amount of heat eliminated, water vaporized, carbon dioxid produced, and oxygen consumed. The results of such experiments show that with all four factors there is a most satisfactory agreement between the amounts measured and the theoretical amounts. . . .

"To obtain duplicate results in the determination of a single element or radicle by chemical analysis frequently requires a number of determinations, and when two factors are simultaneously determined [as is the case with the respiration calorimeter], as carbon and hydrogen in elementary organic analysis, still greater difficulty is experienced. It can therefore easily be seen that the simultaneous determination of four factors presents a problem that is rarely

met with in either physical or chemical operations and heretofore never in physiological chemical operations. Indeed, the apparatus has proved as accurate as any chemical process ordinarily used in a laboratory, and it can accordingly be characterized, both calorimetrically and chemically, as an instrument of precision."

For earlier work, see previous notes (E. S. R., 17, p. 1098; 18, p. 1151).

A comparison of the direct and indirect determination of oxygen consumed by man, F. G. Benedict (*Amer. Jour. Physiol., 26 (1910), No. 1, pp. 15–25*).—The direct determination of oxygen in experiments with the respiration calorimeter in comparison with calculated values is discussed by the author.

From the results of check tests in which alcohol was burned in the respiration chamber, and more particularly from the results of determinations of oxygen by both the direct and the indirect methods, the conclusion is reached that the direct determination is accurate, "and that experiments on man can be made in which the direct determination of oxygen is fully substantiated by the indirect determintion. Personal experience would indicate that the errors involved in the indirect determination of oxygen are such as to preclude its use under conditions that ordinarily obtain in even the most perfect forms of respiration apparatus, and that accurate determinations of the oxygen consumption of man are practicable only by means of the direct method.

"While a number of years ago the close agreement between the direct and indirect determinations of oxygen shown in these experiments would have been of value as an indication that no demonstrable quantities of nitrogen were eliminated as such from the body of man, in the light of the recent brilliant research of Krogh [E. S. R., 18, p. 760], it is unnecessary to more than point out the significance of this agreement in experiments on man as substantiating the results of Krogh when experimenting on small animals."

ANIMAL PRODUCTION.

Recent science in plant and animal breeding, W. M. Hays (*Live Stock Jour. [Chicago], 51 (1910), No. 25, pp. 353–355, 358, 359, figs. 15*).—An address before the American Seed Trade Association, June 22, 1910, in which the author points out the value of scientific investigations in the breeding of plants and animals.

The struggle for existence and breeding experience, Arnim-Schlagenthin (*Der Kampf ums Dasein und züchterische Erfahrung. Berlin, 1909, pp. X+108*).—A discussion of Mendel's law, mutation, and other factors concerned in the evolution of plants, animals, and man from the standpoint of one who does not believe in the inheritance of acquired characters. The view is expressed that the factor "struggle for existence" has little or no value in the evolution of wild or domesticated species or in the progress of nations.

The controversy on the significance of the nucleus in inheritance and development, O. Hertwig (*Der Kampf um Kernfragen der Entwicklungs- und Vererbungslehre. Jena, 1909, pp. IV+122; rev. in Nature [London], 83 (1910), No. 2119, p. 426*).—The author presents evidence to strengthen the theory that the basis of inheritance is localized in nuclear substance and in refutation of the arguments which have been advanced against the theory.

The catalytic activity of the developing hen's egg, M. C. Winternitz and W. B. Rogers (*Jour. Expt. Med., 12 (1910), No. 1, pp. 12–18, chart 1*).—Two series of fresh eggs were procured. Some of the eggs were tested immediately for catalytic activity, others were left unincubated for varying periods up to 2½ months, and the remainder were incubated at approximately 37° C., test for catalytic activity being made at intervals of 2¼ hours. The results with the 2 series were practically the same.

"The entire fresh egg has a slight but definite catalytic power which remains practically constant even though the egg be kept for several months at room temperature. The separate parts of the egg, germinal center, yolk, and white have practically no activity when tested individually. The entire unfertilized egg shows no catalytic activity even after incubation at 38° for 21 days. The germinal portion of the incubated fertilized egg rapidly acquires the power of decomposing hydrogen peroxid, while the yolk and white together or separately show no such increase, nor is there any activity to be found in the amniotic fluid. It seems, therefore, that the catalytic power of the developing egg is formed from the contents of the egg which themselves show little action, by the developing germinal portion, independent of all external influences except heat (38°) and air."

Ovulation in mammals, with special reference to the mouse and rat, W. B. KIRKHAM (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 18* (*1910*), *No. 5, pp. 245–251*).—Following a review of investigations on ovulation in connection with pairing in sheep, swine, dogs, and small mammals in which the results seemed to be conflicting as to whether or not ovulation is dependent upon pairing, the author reports recent experiments of his own made in order to test this point. He found that ovulation took place in virgin white mice and in adult white rats without pairing. It is suggested that the mouse is a suitable mammal upon which to investigate the possibility of artificial parthenogenesis.

Methods of artificial parthenogenesis, E. N. HARVEY (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 18* (*1910*), *No. 5, pp. 269–280*).—This is a list of important contributions giving briefly the various methods of exciting eggs to develop, together with results and references, in the hope that it may prove of value to future workers.

Studies on the determination of the female sex, A. RUSSO (*Studien über die Bestimmung des weiblichen Geschlechtes. Jena, 1909, pp. 105, figs. 32*).—This contains an account of the histology and physiology of the ovarian tissues, and reports investigations which have been previously noted from another source (E. S. R., 21, p. 269).

Russo on sex determination and artificial modification of the Mendelian ratios, W. E. CASTLE (*Amer. Nat., 44* (*1910*), *No. 523, pp. 434–439*).—The work of Russo, noted above, is criticised on two grounds: First, that Russo's claim that the female sex can be produced artificially by injections of lecithin is vitiated by the fact that he reported only selected experiments which were favorable to his theory; second, that his results might be interpreted differently if the gametic constitution of the breeding stock were known.

Experimental studies on somatic and sexual differences, I, J. MEISENHEIMER (*Experimentelle Studien zur Soma- und Geschlechts-Differenzierung. Jena, 1909, pp. VII+149; rev. in Nature* [*London*], *83* (*1910*), *No. 2116, pp. 335, 336; Amer. Nat., 44* (*1910*), *No. 521, pp. 316–319*).—By means of an electric needle and knife the sexual glands, anlage of accessory genital apparatus, and anlage of wings were removed from all six larval stages of the moth *Lymantria dispar* and the sexual glands of the opposite sex were transplanted. Another series of experiments were also tried on *Orgyia gonostigma*.

From these experiments the author concludes that in these moths the primary sex cells have no influence on secondary sex characters. This does not lend support to the theory that internal secretions from the sex glands affect the soma, as both primary and secondary sexual characters are inherited directly from the young germ cells.

The influence of the cortical centers on the sexual organs, C. CENI (*Arch. Ital. Biol., 48* (*1907*), *No. 3, pp. 49–66, figs. 11; Riv. Sper. Fren., 35* (*1909*); *abs. in Arch. Rassen u. Gesell. Biol., 7* (*1910*), *No. 2, pp. 248, 249*).—The muti-

lation of the cerebral cortex of mature fowls by thermo-cautery produced a torpid condition, though the sexual impulse was retained. Various degrees of sterility resulted. Pullets were less affected than males. When the eggs were fertile the development of the embryonic chick was retarded and often remained uncompleted. When the operation was performed on young fowls the development of secondary sexual characters was arrested.

On the influence of alcohol upon the germ plasm, G. KABRHEL (*Arch. Hyg.*, *71* (*1909*), *No. 1*, *pp. 124–130*; *abs. in Arch. Rassen u. Gesell. Biol.*, *7* (*1910*), *No. 2*, *pp. 249, 250*).—In these experiments with dogs the offspring, born of animals which had been trained to drink beer, preferred beer to water, hence the author concluded that the beer affected the germ plasm. The reviewer suggests that the changed appetite of the offspring was due to the fact that the bitter principle in the beer was carried to the milk of the mother, and that the offspring readily drank beer because they had been accustomed to it through the milk rather than because of any effect on the germ cell.

The structure and life of animals.—I, The animal body as an independent organism, R. HESSE (*Tierbau und Tierleben.—1. Band: Der Tierkörper als Selbständiger Organismus. Leipsic and Berlin, 1910, pp. XVII+789, pls. 15, figs. 480*).—This is a treatise on animals from a biological point of view. Special attention is given to the relation between the form of an animal and its environment, and to the harmony between the structure of organs and the functions which they perform.

The influence of nutrition upon the animal form, H. J. WATERS (*Proc. Soc. Prom. Agr. Sci.*, *30* (*1909*), *pp. 70–98*; *Separate*, *pp. 29*, *figs. 6*).—This is a preliminary report on the study of the effect of limiting the quantity of feed upon the size, form, and development of immature unsexed high-bred beef cattle which were mostly crosses between Shorthorns and Herefords.

In the first experiment reported the calves were fed until about 6 months of age all they would eat of whole milk, mixed grain, and alfalfa. The data reported covered a feeding period which continued on the average for about 9 months to 30 months of age. The character of the feed was the same for all animals, but the amount was varied to secure the different ratios of increase in live weight required.

For each centimeter of increase in width of hip, made by the full-fed group, the increase was 1.48 cm. in height at the withers, whereas in the case of the groups so fed as to gain only ½ lb. in live weight per day, there was an increase of 2.31 cm. in height for each centimeter increase in width of hip. In the maintenance animals the ratio of gain in width to height was 1:3.11. The ratios of increase in width of hip, increase in length of foreleg, and in width of chest to length of leg also showed that the height growth of poorly fed animals was relatively much more rapid than the width growth.

Measurements were also made on young growing animals, beginning in some instances at birth and continuing up to from 8 to 14 months. The results gave further evidence that a decreased supply of nourishment manifested itself more quickly in width than in height development. Histological examination showed that there was but little difference between the diameter of the muscle fibers from animals in average farm condition and those in a highly fatted or show condition, but that when an animal was held for a long period of time on a very low nutritive plane the diameter of the muscle fiber was much reduced. The increase in the thickness of the flesh covering and the difference in the outline or form of the body of an animal that has been fattened, or changed from an ordinary farm condition to a market or show condition, was due chiefly to the increase in the number and volume of the fat cells rather than to increased size of muscle fiber. The diameter of the fat cells was found to range from 20

microns in animals on a low nutritive plane to 250 microns in animals in high show condition.

How an animal grows, H. J. Waters (*Quart. Rpt. Kans. Bd. Agr., 29 (1910), No. 113, pp. 59–86, figs. 7*).—This article, on the influence of nutrition on the size and form of animals, is based on the data contained in the article noted above.

Investigations on the effect of nonprotein compounds on gain in body protein in ruminants, O. Kellner et al. (*Landw. Vers. Stat., 72 (1910), No. 5–6, pp. 437–458*).—A daily ration of 300 gm. oat straw, 350 gm. starch meal, 250 gm. sugar, 25 gm. crystalline asparagin, 150 cc. ammonium citrate solution and 6 gm. of salt was fed to 3 lambs, 2 of which not liking the ration were dropped from the experiment. The daily intake of nitrogen of the remaining lamb was about 12.198 gm. During the first week there was a loss of body nitrogen, but thereafter the nitrogen balance remained in equilibrium. At the end of 1 month the amids were replaced by gluten meal, which was fed for 18 days. During this period the daily intake of nitrogen was 11.096 gm. The average increase of body nitrogen the last 13 days was 1.93 gm.

A second experiment was a repetition of the first, except that a third period was added in which both the amids and gluten meal were fed at the same time. The experiment began with 3 lambs, but 1 was dropped as the ration was not relished. The daily body gain in nitrogen of the first lamb was 0.58 gm. in the first period, 2.64 gm. in the second period, and 4.83 gm. in the third period. With the second lamb there was a daily loss of 1.56 gm. during the first period, a gain of 1.52 gm. in the second period, and a gain of 3.82 gm. in the third period. That the gains of both lambs were so large in the third period indicates that nonprotein nitrogen has some valuable function in the ration and yet can not displace the protein.

Investigations on maize and maize silage, E. J. Russell (*Jour. Southeast. Agr. Col. Wye, 1908, No. 17, pp. 434–441*).—The average composition of green maize cut about October 1 was dry matter 16.8, nitrogen 1.78, ether extract 0.48, nitrogen-free extract 9.33, fiber 4.21, and mineral matter 1 per cent. The average composition of silage for 6 seasons was dry matter 13, nitrogen 1.45, ether extract 0.4, nitrogen-free extract 5.4, fiber 4.8, and mineral matter 1 per cent. The average loss by chemical changes taking place in the silo was dry matter 36, total nitrogen 26, ether extract 16, nitrogen-free extract 55, fiber 8, and furfurol 32 per cent. The loss of protein nitrogen was 55 per cent, and there was a gain of 83 per cent in the nonprotein nitrogen.

Rye germ, M. Kling (*Landw. Vers. Stat., 72 (1910), No. 5–6, pp. 427–435*).—Analyses of pure germ gave the following percentages: Water 14.7, water-soluble protein 9.5, water-insoluble protein 26.18, amids 3.82, total protein 39.5, free fatty acids 1.74, total fat 10.57, pentosans 6.86, nitrogen-free extract 27.99, fiber 2.24, calcium oxid 0.05, phosphoric acid 2.97, and total ash 5. No starch was found.

The rye germ as it left the meal contained only 60 to 70 per cent pure rye germ, the rest consisting of weed seeds, chaff, and other wastes. Two chemical analyses gave the following averages: Water 15.5, crude protein 28.7, pure protein 25, fat 7.9, nitrogen-free extract 36.1, fiber 6.7, and ash 5.1 per cent. It is stated that some pigs fed for 6 weeks on rye germ became sick and some died, though it is not known definitely whether the trouble was due to the rye or some other cause.

Concentrated commercial feeding stuffs, W. J. Jones, Jr., et al. (*Indiana Sta. Bul. 141, pp. 167–440*).—This contains the text of the state feeding stuffs law, rulings which have been made under it, and similar data. Analyses are reported of 2,702 samples of feeding stuffs, including the by-products of wheat,

corn, oats, rye, and barley; cotton-seed, flax, buckwheat, corn-and-cob meals; alfalfa products, malt sprouts, distillers' grains, condimental and mixed feeds.

Inspection and analyses of commercial feeding stuffs, 1909–10 (*Mississippi Sta. Buls. 137, pp. 4–25; 138, pp. 3–29*).—Analyses are reported of rice bran, rice shorts, rice polish, wheat by-products, cracked corn, corn chop, and poultry and mixed feeds.

Concentrated feeding stuffs, C. S. CATHCART ET AL. (*New Jersey Stas. Bul. 230, pp. 3–50*).—This reports the results of the tenth annual inspection of concentrated feeding stuffs sold in the State. Analyses are reported of 491 samples of dried beet pulp, cotton-seed meal, linseed meal, gluten feed, peanut meal, dried brewers' grains, malt sprouts, ground oats, alfalfa meal, feeding flour, by-products of wheat, rye, corn, barley, and buckwheat, and poultry and mixed feeds.

Notices of judgment (*U. S. Dept., Agr. Notices of Judgment 334, 378, 379, 381, p. 1 each*).—These relate to the adulteration and misbranding of oats.

Report of animal industrialist, J. M. SCOTT (*Florida Sta. Rpt. 1909, pp. XV, XVI*).—This is a continuation of previous work (E. S. R., 20, p. 1066). Four steers of poor quality were fed a ration of corn, velvet beans, and sweet potatoes, which proved to be unsatisfactory as the sweet potatoes were too laxative. On adding Japanese cane to the ration better gains were made. During an entire period of 60 days the average daily gain per head was 3.13 lbs. at a cost of 3.92 cts. per pound. The amount of food required for 1 lb. of gain was 9.6 lbs.

Report of bullock feeding experiments, W. R. TUCKER and B. N. WALE (*Jour. Southeast. Agr. Col. Wye, 1908, No. 17, pp. 15–24*).—Experiments were made in replacing roots with molascuit in rations for 10 steers and 2 heifers during a period of 4 months.

Lot 1, fed a ration of linseed meal, cotton-seed cake, rice meal, chaff, hay, swedes, and mangels, made an average daily gain in weight of 2.13 lbs. per head, with an average profit per head of 11s. 2½d. Lot 2, fed a similar ration except that molascuit took the place of roots, made an average daily gain of 1.49 lbs. per head, but at a loss of £1 13s. 7½d per head. The roots were rated at 7s. 6d. per ton. Molascuit gave good results during the first 2 months, but was very unsatisfactory for finishing.

The cost of feeding heifers, J. M. TRUEMAN (*Connecticut Storrs Sta. Bul. 63, pp. 145–159, figs. 10*).—This bulletin contains general information on raising calves, and reports the actual cost of feeding 5 heifers from birth until 2 years of age.

The average cost of the feed the first year was $28.24 and for the second year $27.25. The labor, interest, and other items would make the total cost about $71 for the 2 years, from which should be deducted $5 for the value of the manure. The cost of the feed was rated as follows: New milk, $2 per 100 lbs.; skim milk, 25 cts. per 100 lbs.; hay $12, silage $4, and grain $30 per ton.

Attention is called to the advantages of placing the animal in a definite position in front of a coordinate screen when photographs are taken so that the conformation of growing animals can be compared.

Cotton-seed oil for calf feeding (*Jour. Southeast. Agr. Col. Wye, 1908, No. 17, pp. 37–40*).—Cotton-seed oil was tested as a substitute for cream in feeding calves. At the commencement of the test the calves were 8 weeks old, and the feeding period lasted 5½ weeks. Lot 1, receiving new milk which was gradually decreased from 9 to 4 qts. daily, received as a supplementary ration linseed cake gruel. The average daily gain was 53 lbs. per head for the whole period, at a cost of £1 14s. 11d. per head. Lot 2 was gradually accustomed

to a ration of separated milk and cotton-seed oil and made an average gain of 52 lbs. per head, at a cost of 10s. 4½d.

The sheep of the early inhabitants of our mounds, L. Broekema (*Cultura, 22 (1910), No. 259, pp. 136–150*).—Bones of sheep found in refuse piles of Holland are illustrated and described. Apparently they are identical with the remains of *Ovis aries palustris* and *O. aries studeri* found in the Swiss pile works and other deposits of the Neolithic and Bronze ages.

Report on pig feeding experiments, F. Blagrove and B. N. Wale (*Jour. Southeast, Agr. Col. Wye, 1908, No. 17, pp. 25–28*).—The object of this experiment was to compare rice meal with barley meal for fattening pigs.

Five pigs of the large black Kent breed 12 weeks of age, previously fed on barley meal soaked in water 12 hours before feeding, were continued on this feed, making an average gain of 18 lbs. per week. In a similar lot, rice meal gradually replaced the barley until the rice became 2⁄3 of the ration, an entire substitution not being made because the pigs would not eat it. The average gain of this lot was 10.5 lbs. per week. The rations were then reversed for 8 weeks, and the first lot, which then received the rice, gained 16.25 lbs. per week, and the second lot lost 15.5 lbs.

Feeding experiments with potato meal and dried potato flakes as supplementary feeds for pigs at the dairy institute at Proskau in the summer of 1909, J. Klein (*Milchw. Zentbl., 6 (1910), No. 5, pp. 193–199*).—In continuation of earlier work (E. S. R., 20, p. 780), 12 pigs, 6 weeks of age, were divided into 3 groups and fed for 12 weeks on a basal ration of skim milk and ground barley. The first group also received about 0.275 kg. of potato meal per head per day and made an average daily gain of 0.308 kg. per head. Group 2, which received 0.275 kg. of potato flakes, made a corresponding gain of 0.362 kg. Group 3, which received 0.275 kg. of potato flakes inverted with diastasolin, made an average daily gain of 0.374 kg. per head. The potato flakes were more economical than potato meal as they cost only about one-half as much.

Pig feeding experiments with sweet and sour skim milk at the dairy institute at Proskau, 1909, J. Klein (*Milchw. Zentbl., 6 (1910), No. 5, pp. 215–222*).—Twelve pigs, 3 months of age, were divided into 2 groups and fed for 12 weeks a basal ration of ground barley and potato flakes to which fish meal was also added the latter half of the period. Group 1 received an average of 5.5 kg. of sweet milk per head as a supplementary ration and made an average daily gain per head of 0.661 kg. and dressed 81 per cent of the live weight. Group 2, which received 5.5 kg. of sour milk per head per day, made a corresponding gain of 0.655 kg. and dressed 80.65 per cent. This result agreed with that of previous experiments.

There seemed to be no advantage in souring the milk as there was a slight loss of sugar, though it was thought that sour milk had a slight diatetic effect which offsets the loss of sugar. There was no noticeable difference in the chemical composition of the flesh. Analyses of the feeds are given.

The inheritance of coat color in horses, J. Wilson (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1910), No. 28, pp. 331–348*).—The author presents data on the relative dominance of coat color in horses, obtained from studbooks. The validity of the conclusions drawn are somewhat affected by the varying notions of horse breeders as to color.

In the Shires and Clydesdales black and chestnut were recessive to bay and brown, and all four were recessive to gray and roan. In thoroughbreds black was dominant to chestnut and recessive to brown. Brown was probably dominant to bay. In all breeds dun was probably dominant to black, brown, bay, and chestnut. The author states that most of the thoroughbreds recorded in the studbooks as blacks are really browns.

Some variations in the skeleton of the domestic horse and their significance, F. EASSIE (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1910), No. 27, pp. 321–330, pls. 5, figs. 9*).—The author illustrates by diagrams several ways in which the skeleton of the domesticated horse has deteriorated from the wild horse. These defects, such as the upright scapula, wedge type of limbs, and lengthening of the spine, humerus, and femur, are thought to be accompanied by a loss of vitality, strength, and nervous energy. Attention is called to the value of knowing whether or not these defects are inherited in Mendelian fashion.

The gait of the American trotter and pacer, R. JORDAN, Jr. (*New York, 1910, pp. X+324, pls. 12, figs. 212*).—A report of investigations of the principles concerned in the proper balancing of the horse in motion. The attitude and motion of the legs was studied in connection with the tracks made by the hoofs on the ground. Measurements were made of the length of stride and of the lateral deviations and angle of the shoe from the median line.

Where the gait was not square it was found that in the forelegs the greater total variation in length of stride occurred in the stronger leg, whereas in the hind legs the greater total variation occurred in the weaker leg. A right or wrong manner of standing was maintained when in action. From the studies of faulty gaits practical conclusions were drawn concerning their remedy by shaping the hoof, by changing the style of shoe, and by methods of training.

Present status of the horse breeding industry in Pennsylvania, 1908 (*Penn. Live Stock Sanit. Bd. Circ. 16, pp. 142*).—This contains the stallion law enacted in 1907, a directory of owners of pure-bred stallions, and other matters of interest to horse breeders.

Horse breeding (*Dept. Landb. Nijv. en Handel, Verslag. en Meded. Dir. Landb. [Netherlands], 1909, No. 6, pp. 102*).—This is a report containing statistical data on pure-bred stock, the manner of recording pedigrees in the studbook, and methods of breeding, feeding, and managing horses in the different Dutch districts.

The army horse, C. GUERRERO (*Amer. Breeders Mag., 1 (1910), No. 1, pp. 30–38*).—An account of the stud farm of Trakehnen, Germany, and the methods practiced there of breeding horses for the German army, together with remarks on the improvement of horses in other countries.

Studbook of the Belgian horse, LEYDER (*Stud-book des Chevaux de Trait Belges. Brussels, 1909, vol. 17, pt. 1, pp. XXIV+1467, pl. 1*).—Besides the pedigrees recorded there is some introductory matter concerning the improvement of the Belgian horse during the past 30 years. The average measurements of the stallions which were made by the author in 1880 were as follows: Height 1.65 meters, circumference of chest 2.26 meters, depth of chest 0.757 meter, and circumference of cannon 0.25 meter. The average of the measurements made in 1906 were height 1.67 meters, circumference of chest 2.45 meters, depth of chest 0.79 meter, and circumference of cannon 0.267 meter.

The poultry manual, T. W. STURGES (*London, 1909, pp. XVIII+597, pls. 34, figs. 17*).—A practical poultry book, by a breeder of many years' experience, on feeding, incubation, housing, and management of poultry, and preparing poultry for exhibition. Descriptions of American, European, and Asiatic breeds of fowls, Bantams, ducks, geese, and turkeys are given. A glossary of technical terms is appended.

Poultry breeding, M. PURVIS (*Chicago, 1910, pp. 323, pl. 1, figs. 143*).—A practical poultry book upon breeds, breeding, and management of fowls, ducks, geese, and turkeys. The arrangement of topics is in alphabetical order. The data obtained are largely from the experience of the author and from experiment station literature.

Turkeys, ducks, and geese, H. A. Nourse et al. (*St. Paul, Minn., 1909, pp. 128, figs. 39*).—A treatise on breeds, breeding, hatching, rearing, fattening, and selling turkeys, ducks, and geese.

Hatching and rearing of turkeys by artificial methods, H. L. Blanchard (*Washington Sta. Bul. 96, pp. 3–8*).—This bulletin contains an account of an experiment in raising turkeys, including incubation, brooding, feeding, and preparation for market.

Experience in raising Virginia deer, C. H. Roseberry (*Amer. Breeders Mag., 1 (1910), No. 1, pp. 50–52*).—An account of the author's experience covering a period of 19 years in raising Virginia white-tailed deer.

Legislation affecting the raising of deer and elk for profit, D. E. Lantz (*Amer. Breeders Mag., 1 (1910), No. 1, pp. 42–47*).—A review of the legislation in the various States which recognize private rights in domesticated big game.

The larva and spat of the Canadian oyster, J. Stafford (*Amer. Nat., 43 (1909), No. 505, pp. 31–47, pl. 1; 44 (1910), No. 522, pp. 343–366, pl. 1*).—The author reports studies of the embryo of the oyster and directs attention to the results obtained on problems relating to oyster culture.

Larval oysters in all stages from the freshly fertilized egg to full-grown larvæ were found suspended in the water of Richmond Bay, Prince Edward Island, in July and August. Stages hitherto unobserved were taken in a plankton net. The free-swimming period was found to last about 1 month. Normal fixation took place when the larval shell was about 0.38 mm. long.

DAIRY FARMING—DAIRYING.

Journal of the British Dairy Farmers' Association (*Jour. Brit. Dairy Farmers' Assoc., 24 (1910), pp. 233, figs. 6*).—This contains articles by various authors on the use of milk records, the Cheshire cheese industry, contagious abortion in cows, the milking trials of 1909, and other matters of interest to dairymen.

Feeding experiment with cows, J. M. Scott (*Florida Sta. Rpt. 1909, pp. XVI–XVIII*).—Previously noted from another source (E. S. R., 23, p. 78).

Feeding oil to milking cows, J. Mackintosh and W. Goodwin (*Jour. Southeast. Agr. Col. Wye, 1908, No. 17, pp. 218–228*).—The addition of peanut and coconut oils to the rations of milking cows produced no appreciable difference in yield of milk or percentage of fat. From 2 to 4 oz. of peanut oil per day per head improved the flavor of winter butter, but larger quantities made the cream difficult to churn and the butter was soft in texture. Coconut oil also made cream difficult to churn but had a hardening effect on the butter, which was of good flavor, texture, and appearance.

Note on the composition of milk yielded by cows fed on pasture manured with phosphates and potash, J. Golding and S. G. Paine (*Analyst, 35 (1910), No. 411, pp. 246, 247*).—The application of superphosphate and sulphate of potash on pastures did not increase the percentage of phosphoric acid or potash in the milk.

The composition of milk, H. D. Richmond (*Analyst, 35 (1910), No. 411, pp. 231–237*).—Analyses of 18,519 samples of milk received from farms are reported. The average results were as follows: Morning milk, specific gravity 1.0323, fat 3.53 per cent, and solids-not-fat 8.93 per cent; evening milk, specific gravity 1.032, fat 3.94 per cent, and solids-not-fat 8.92 per cent. The lowest percentage of fat occurred in May and June, the highest in October and November.

A sample of asses' milk gave the following results: Specific gravity 1.034, fat 0.9 per cent, solids-not-fat 8.82 per cent, milk sugar 6.49 per cent, protein

1.68 per cent, ash 0.45 per cent, acid 4.6°, aldehyde figure 10.9°, and protein factor for the aldehyde figure 0.154.

The milk supply of cities, A. CLEVISCH (*Die Versorgung der Städte mit Milch. Hanover, 1909, pp. VIII+96, pls. 4*).—This consists mainly of statistical information regarding the milk supply of the cities in Germany. A bibliography is appended.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 331, 332, 335, 336, 338, 341, 344, 347, 351, 370, p. 1 each*).—These relate to the adulteration of milk and cream, misbranding of butter and of Roquefort cheese, and the adulteration and misbranding of Neufchatel cream cheese.

The objections to goat milk, J. CRÉPIN (*Hyg. Viande et Lait, 4 (1910), No. 6, pp. 305–333*).—This is an answer to those who object to the use of goat's milk. Analyses are given of the milk of goats in different countries.

The preparation of soured milk (*Dairy, 22 (1910), No. 258, p. 155, fig. 1*).—A brief description of a patented apparatus called the "lactigenerator," which is used for preparing Bulgarian sour milk. It consists of a milk vessel surrounded by a water jacket, heated by 2 alternative gas jets, one for sterilizing the milk and a smaller one for maintaining a constant temperature during the process of incubation. The sterilizing, cooling, incubating, and final cooling are all done in the same vessel and without handling the milk during the entire process except to remove the cover in order to remove the scum formed during the sterilizing and to add the ferment.

Concerning the yield and sale of cream, H. SCHROTT-FIECHTL (*Mitt. Deut. Landw. Gesell., 25 (1910), Nos. 5, pp. 67, 68; 6, pp. 81, 82; 7, pp. 98–100; 8, pp. 109, 110; 11, p. 167, 168; 13, pp. 195, 196; 14, pp. 207–209; 15, pp. 220, 221; 21, pp. 313–315; 22, pp. 340, 341*).—This series of articles contains statistical data on the production and sale of milk, cream, and butter in Germany. The advantages of different styles of separators and the factors which influence the separation of cream and related matters are also discussed.

In comparing the relative advantages of selling milk and cream the author lays considerable emphasis on the economy of utilizing skim milk on the farm where it is produced. The danger of spreading tuberculosis when the mixed skim milk is sent from the creamery to the farm is pointed out. Although the author thinks that as a general proposition it is more economical to sell milk rather than cream, this is a question which each patron must decide for himself as local conditions may materially affect the situation.

Dairy cattle and the butter test: Twenty years' experience, E. MATHEWS ET AL. (*Jour. Roy. Agr. Soc. England, 70 (1909), pp. 36–60, figs. 13*).—This contains an account of improvements made in recent years as to the manner of conducting butter tests at English dairy shows. There is also a discussion of the factors that influence the churnability of creams. Tables are given showing the percentages of different sizes of fat globules in milk of various grades of cows, and of the percentages of the total fat content in the different sized globules.

Results of butter inspection in the Baltic and northwest region of Russia from November, 1909, to February, 1910, HAPPICH (*Abs. in Milchw. Zentbl., 6 (1910), No. 5, pp. 236–239*).—Analytical data of butter are reported. The range of constants was as follows: Water 9.1 to 16.2 per cent, melting point 30.5 to 35.5°, acidity 0.8 to 4.2 per cent, Reichert-Meissl number 21.4 to 30.7, Köttstorfer number 219.1 to 235.8, specific gravity 0.8635 to 0.8665, and Krismer number 52 to 65.5.

On the presence of fungi in butter, H. KÜHL (*Centbl. Bakt. [etc.], 2. Abt., 27 (1910), No. 4–9, pp. 167–169*).—The author describes a species of Dematium which was found with a blue mold in rancid butter.

Whey butter, C. F. DOANE (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 161, pp. 7*).—This is a report of an experiment by the Dairy Division of this Department in making whey butter in a Wisconsin cheese factory.

The yield of butter for different months varied within comparatively wide limits. For June it was 2½ lbs. per 1,000 lbs. of milk, while for October it was 3¼ lbs. The daily variation was even greater, varying from 2 to 5 lbs. of butter per 1,000 lbs. of milk. To secure the maximum yield it was necessary to save the drippings from the milled curds. In one instance 58 lbs. of whey, which tested 11 per cent fat, dripped from the milled curd of a 5,000-lb. vat of milk.

In making whey butter it was found to be the best practice to run the whey directly from the vats to a thoroughly sanitary tank and separate with as little delay as possible. A pump is necessary for elevating the whey from the tank to the separator. It is believed that from 20 to 30 per cent of starter improves the flavor. The butter made from whey is better than a large part of the butter commonly sold to retail trade, but the drippings from the milled curd give the butter a characteristic flavor somewhat difficult to describe, which brings down the theoretical score although it does not seem to injure the butter for table use. Whey butter is apparently a little softer than the regular creamery butter, but a number of tests showed that this was not due to excessive moisture. The butter sold to the local trade brought a little less than the best creamery butter, while the portion shipped to Chicago sold for 2 to 3 cts. under the regular price for creamery butter.

It is thought that for factories having a maximum daily run of 10,000 lbs. or more the making of whey butter would be a profitable undertaking for both the factory and the farmer. The cheese factory in which the Dairy Division has been interested paid to the farmers about $1,000 for their share of the butter in one year, and this sum was a clear gain to the farmers. In addition to this, it is pointed out that the patrons of the cheese factory can buy the butter at a lower price than creamery butter shipped in and retailed from local stores.

Further experiments on the care of milk for cheese making, G. H. BARR (*Ann. Rpts. Dairymen's Assocs. Ontario, 1909, pp. 42–50*).—Instead of using milk from 2 herds, as in the former experiments (E. S. R., 21, p. 781), the object was to study the effect of aerating and cooling by having the patrons do the work themselves under ordinary farm conditions. The patrons were divided into 2 groups and given different directions as to the care of the evening's milk.

The milk cooled by setting the milk cans in water gave a lower temperature when delivered at the factory than when the milk pails were set in water or when shotgun cans were used. When the temperature of the air did not go below 65° during the night the milk in the vat was overripe when not cooled, but when cooled the milk arrived in sweet condition when the temperature did not go below 71°. When the average temperature of the evening's milk was over 69°, and the mixed milk over 75°, the milk in the vats was overripe. It is recommended that the evening milk be cooled to 65°. If the morning's milk must be mixed with it, it should be cooled to 60°, but if possible it is better to deliver the night and morning milk in separate cans during warm weather.

The temperature of the nights had very little effect on the condition of the curd tests and curds when the milk was cooled, but a decided effect when the milk was not cooled. The curd tests showed that there was a decided advantage in cooling without aerating. The milk which was stirred without cooling gave better flavored curds and less gas than that aerated, but it was in an overripe condition in the hot weather when delivered at the factory and caused fast working curds, so that such treatment is not recommended in warm weather.

The greatest loss from overripe milk was 5 lbs. of cheese in 3,869 lbs. of milk. The loss in making up gassy milk varied considerably. One day there was a

loss of 10.88 lbs. of cheese in a vat of 3,511 lbs. of milk. On another day there was very little loss. The greatest loss from milk both gassy and overripe was 8.9 lbs. of cheese in a vat of 4,469 lbs. of milk. The average loss from gassy and overripe milk was greater than the average loss from either gassy or overripe milk alone.

The loss of fat in whey was as follows: From milk cooled without aeration 0.2 per cent, cooled and dipped 0.22 per cent, stirred without cooling 0.22 per cent, dipped without cooling 0.24 per cent, in a sweet, clean-flavored condition 0.194 per cent, in gassy condition 0.216 per cent, in overripe condition 0.25 per cent, and in overripe and gassy condition 0.273 per cent.

Experiments with paraffining of cheese, N. O. Hofman-Bang, E. Holm, and H. P. Lunde (*Ber. K. Vet. og Landbohöjskoles Lab. Landökonom. Forsög [Copenhagen], 69 (1910), pp. 53; N. Y. Produce Rev. and Amer. Cream., 39 (1910), No. 11, pp. 424, 425*).—Experiments with 2 to 3 weeks old Danish cheese (Cheddar type) were conducted at four Danish combined creameries and cheese factories during the season of 1908. The paraffining was done at a temperature of 200 to 220° C., and increased the weight of the cheese 0.4 per cent.

The average figures for the shrinkage in weight obtained were, for paraffined cheese during periods of 30, 60, and 90 days, 0.3, 1.7, and 3.2 per cent, respectively, and for the control cheese for the same periods, 2.9, 5.1, and 7.5 per cent. Each time a lot of cheese was weighed, a cheese was scored by two or three judges. The results of the scoring show that the quality of the cheese was not affected by the paraffining, either as regards its shape, color, texture, odor or taste.

The trials lead to the conclusion that the practice of paraffining is to be recommended for the common types of Danish cheese. The work of curing the cheese is decreased by paraffining, especially in the case of dry curing rooms, and the expenses incident to the method are small in comparison with the advantages obtained. The paraffined cheese must be handled more carefully than common cheese, hence the method is especially advantageous in the case of small forms of cheese.

Concerning kolozsvár cheese, Jászberényi and Jek (*Mezögazdasági Szemle, 27 (1909), pp. 497-500; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 11, p. 673*).—The authors report chemical investigations and give the details of manufacture of this cheese, which is made from the milk of the buffalo.

It required 920 liters of milk to make 71 cheeses that weighed collectively 95.15 kg. before ripening and 85.05 kg. after ripening. The interior ripening was found to be similar to that which takes place in Trappist cheese. Chemical analysis gave the following results: Water 40.69, fat 28.12, protein 29.04, ash 2.35, salt 0.61, lactic acid 0.84, and soluble nitrogen 4.24 per cent, and index of refraction at 40° C., 39.6.

VETERINARY MEDICINE.

Immunity, protective vaccination, and serum-therapy, A. Dieudonné (*Immunität, Schutzimpfung und Serumtherapie. Leipsic, 1909, 6. ed., rev., pp. VII+240, figs. 5*).—This, the sixth edition of this work, considers (1) natural resistance (inborn immunity), (2) acquired immunity, (3) vaccination (artificial immunization), and (4) blood serum-therapy. The appendix considers the more important immunity reactions and has a good technical vocabulary.

Vaccine infection of rabbits by intracutaneous injection of cowpox virus, J. Novotny and B. Schick (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 5 (1910), No. 6, pp. 688–694*).—Injecting white rabbits with cowpox lymph intra-

cutaneously led to positive results, but seemed to possess no advantages over the usual method of vaccination.

The use of vaccines in septic and inflammatory conditions, E. W. CUSHING (*Jour. Amer. Med. Assoc., 54 (1910), No. 24, p. 1992*).—"Vaccines, or killed cultures, act by increasing the resistance of the patient. The opsonic index practically is not of much use in acute conditions. Autogenous vaccines are preferable to stock vaccines, except in certain cases of staphylococcus infection. The best results are obtained in the following order: Infection from colon bacillus, pneumococcus, staphylococcus. The results are not satisfactory with streptococcus in rapid virulent infections. In chronic infections and in cases of little virulence streptococcus vaccines give satisfactory results, especially in moderate puerperal cases. Vaccines are not successful in acute gonorrheal infections, but are of much service in gonorrheal arthritis. Vaccines are useful in the following conditions: Puerperal infections, abortions, infections of bladder and kidneys, appendicitis, abdominal operations, post-operative pneumonia, and abdominal fistula."

Transportation of active cowpox vaccine to the African interior colonies, L. VOIGT (*Centbl. Bakt. [etc.], 1. Abt., Orig., 53 (1910), No. 3, pp. 365–368, pls. 2; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 20, p. 410*).—Owing to the fact that vaccine virus is difficult to transport without deteriorating, the author demonstrated that it was possible to vaccinate dromedaries without producing any inconvenience or illness on the part of the animal and showed the possibility of obtaining fully developed pustules in 7 days which contained a very potent and efficient virus.

The inheritance of vaccine immunity, K. SÜPFLE (*Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 1, pp. 38–44; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 20, p. 410*).—Rabbits and glycerinated vaccines were used in these tests to determine whether vaccine immunity was transmissible from mother to offspring. It was found that in most instances no detectable immunity was present, although in a few cases there seemed to be some partial immunity.

Colibacillosis, L. VAN ES (*Amer. Vet. Rev., 37 (1910), No. 2, pp. 200–206*).—A summarized account of this trouble.

In what instances are we justified in assuming that a case of rabies is in the abortive form? V. BABES (*Ztschr. Hyg. u. Infektionskrank., 65 (1910), No. 3, pp. 401–422*).—A comparison of reported cases by various authors and a discussion of them.

Negri and Lentz's bodies and changes in the nerve centers in rabies, L. D'AMATO and V. FAGGELLA (*Ztschr. Hyg. u. Infektionskrank., 65 (1910), No. 3, pp. 353–368, pls. 2*).—The authors were not able to verify Babes's views (E. S. R., 19, p. 382) in regard to the relation of the black granulations found in the nerve centers to the Negri bodies. These peculiar granulations were seldom found in brain areas where the rabic virus was most concentrated, which is against the hypothesis that these bodies represent the innermost granules of the rabies parasite. The authors were also able to observe experimentally that some of the Negri bodies never contained these bodies. Negri bodies which were transplanted on the brain cortex of rabbits were found to become necrotic and then disappear while the rabic virus, on the other hand, was capable of exciting some toxic action on the areas vaccinated. This is contrary to a theory of the parasitic nature of the disease. Lentz's bodies are to be considered, according to the authors, involution bodies of the cell.

Fibro-sarcoma and Sarcosporidiosis, J. SABRAZÈS, MARCHAL and L. MURATET (*Rev. Gén. Méd. Vét., 15 (1910), Nos. 172, pp. 177–191, figs. 12; 173, pp. 247–258; abs. in Vet. Rec., 22 (1910), No. 1141, p. 755*).—The authors report the case of a 4-year old English thoroughbred horse in which the dependent part of

the chest assumed a monstrous development, due to the appearance of hard mamillated tumors, ranging from the size of a pigeon's egg to that of an ostrich's egg. Similar tumor-like masses, causing a deformity which was especially striking in an animal of pure breed, existed in the cannon region of three of the limbs, the right fore limb only being exempt. They refer to the chronic irritation theory of the genesis of neoplasms and suggest that the chronic irritation induced by the sarcosporidia may in this case have been the cause of the sarcomatosis.

A bibliography is appended.

Skin disease (streptococcusblisters) in man supposedly contracted from a case of ray cancer in the horse, CRÉPET (*Abs. in Berlin. Tierarztl. Wchnschr., 26 (1910), No. 26, p. 515*).—A description of a case of a blacksmith who was infected from the hoof of a horse suffering from ray cancer (vegetative iododermatitis). The constitutional symptoms in the man simulated those observed in the horse very closely.

Experimental reproduction of oriental sore in the dog, C. NICOLLE and L. MANCEAUX (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 14, pp. 889–891*).—While it is generally admitted that the transmission of oriental sore takes place through the intermediation of some biting insect, the author thinks that the two factors, man and insect, do not sufficiently explain the etiology of the disease, which in northern Africa always appears at the same time of the year, largely during September and October. In searching for other animals susceptible to the virus, the dog, cat, donkey, horse, sheep, goat, rat, and monkey were inoculated, the dog and monkey proving to be susceptible. In the dog the clinical symptoms are the same as in man and the microscopical findings are similar. The fact that the dog is susceptible is thought to add weight to the theory of a canine origin.

New contribution to the study of Trypanosoma congolense, A. LAVERAN (*Ann. Inst. Pasteur, 24 (1910), No. 2, pp. 81–95*).—The author discusses experiments relating to the pathogenic effects of *T. congolense* on various mammals and distinguishing it from *T. dimorphon* and other species.

Trypanocidal and spirocheticidal action of pyocyanase, S. OHKUBO (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 13, pp. 655, 656; abs. in Sleeping Sickness Bur. [London] Bul. 18, p. 208*).—The author has previously shown that the lipoid substances of pyocyanase possess bactericidal and hemolytic properties. He now finds that a 1:500 solution of Lingner's dialyzed pyocyanase immobolizes Nagana trypanosomes and spirochetes (*Spirochæta gallinarium*) in 30 minutes. Further experiments showed that an alcohol-ether extract of pyocyanase emulsified with saline solution killed the trypanosomes in a dilution of 1:1,000 and spirochetes in 1:500; the remainder of the extract had no trypanocidal or spirocheticidal action. His attempts to immunize rats and mice failed because of the great sensitiveness of the experimental animals to pyocyanase.

The action of ultraviolet rays on trypanosomes, H. BORDIER and R. HORAND (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 10, pp. 634, 635*).—During the course of investigations, studies were made of the action of ultraviolet rays on *Trypanosoma lewisii*. This trypanosome was killed in 15 seconds when exposed to the ultraviolet rays emanating from Kromayer's quartz mercury vapor lamp, but was unaffected by a prolonged exposure to the X-rays.

The manner of transformation of atoxyl into trypanotoxyl, C. LEVADITI and J. MCINTOSH (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), Nos. 10, pp. 444–446; 12, pp. 569–571; abs. in Sleeping Sickness Bur. [London], Buls. 16, p. 128; 17, p. 166*).—The authors have found that the cells of a tissue which has not undergone any previous trituration can transform atoxyl into trypanotoxyl. On

this they disagree with Yamanouchi, who has reported the change to be effected by red blood cells. They conclude that the substance which thus transforms atoxyl is a cell derivative of certain tissues, particularly the skin, that it is soluble in water, thermostable, attenuated spontaneously and requires an optimum temperature (37 to 55° C.) for action.

The third annual report of the state veterinarian of Alabama, 1909, C. A. CARY (*Ann. Rpt. State Vet. Ala., 1909, pp. 30*).—This report includes accounts of tick eradication, the occurrence of tuberculosis, glanders, hog cholera, etc.

The veterinary bacteriological laboratories of the Transvaal (*Pretoria, 1909, pp. 164, pls. 42, figs. 7*).—This publication was issued in commemoration of the opening of the new laboratories at Onderstepoort, Pretoria, in October, 1908, and includes a history of the laboratories and a description of the buildings.

The greater part of the volume is devoted to papers by members of the veterinary bacteriological division, as follows: Immunity in Tropical and Subtropical Diseases, by A. Theiler (pp. 21–51); The Diagnosis of Bacillary Piroplasmosis of Bovines in the Transvaal, by J. Walker (pp. 55–64); Hæmolysis in Practical Veterinary Science, by W. Frei (pp. 67–110); The Anatomy of *Stilesia centripunctata* (the commonest intestinal custode of sheep in the Transvaal), by L. H. Gough (pp. 113–131); and Notes on the Pathological Anatomy of Pleuro-pneumonia (Contagiosa bovum), by K. F. Meyer (pp. 135–164).

Report of the research work of the Imperial Bacteriological Laboratory, Muktesar, 1908–9, J. D. E. HOLMES (*Indian Civ. Vet. Dept. Mem., No. 1, pp. 102, pls. 15, charts 8*).—The first part of this memoir contains 3 papers on surra: (1) Investigation of an outbreak of horse surra with result of treatment with atoxyl, tartar emetic, mercury, and other drugs previously noted from another source (E. S. R., 20, p. 1085; (2) treatment of surra by atoxyl and orpiment, also previously noted (E. S. R., 20, p. 1185), and (3) further experiments on the treatment of surra with atoxyl and orpiment and other preparations of arsenic.

Part 2 consists of an account of immunization against symptomatic anthrax by means of a single vaccine, and part 3, of immunization against hemorrhagic septicemia of bovines. Part 4, which relates to rinderpest, discusses the serum-alone method as a means of combating rinderpest in India, and the nature of the immunity following a simultaneous inoculation of serum and virulent blood where no clinical symptoms of rinderpest are produced. In part 5, a peculiar form of streptotrichosis among cattle is described, as previously noted (E. S. R., 20, p. 1082). A flagellate form of *Piroplasma bovis* is described in part 6, and a note on a giant polynuclear cell is given in part 7.

Report of the government veterinary surgeon for 1908, G. W. STURGESS (*Rpt. Govt. Vet. Surg. [Ceylon], 1908, pp. 8*).—This report includes an account of the occurrence of infectious diseases of cattle, particularly rinderpest.

Observations in regard to a disease occurring in German East Africa which simulates the malignant catarrhal fever of bovines in Germany, LICHTENHELD (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 3–4, pp. 290–301; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 26, p. 514; Vet. Rec., 23 (1910), No. 1148, pp. 17, 18*).—A detailed description of the clinical and pathological findings with cases of a disease which resembles the malignant catarrhal fever of bovines of Germany is presented.

[Eradication of cattle ticks] (*S. C. Live Stock Assoc. Rpts., 1907–8, pp. 77–112, 214–237*).—These reports include 3 papers relating to ticks presented at the meeting of the association held in February, 1907, namely, Tick Eradication, by Tait Butler, Government Aid in Tick Eradication, by W. P. Ellenberger,

and Methods of Eradicating Cattle Ticks, by L. A. Klein; and 2 papers presented at the meeting in February, 1908, one by A. J. Payne on Cattle Tick Eradication, and the other by M. R. Powers on Tick Eradication Work in South Carolina.

Amakebe: A disease of calves in Uganda, D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B, 82 (1910), No. B 555, pp. 256–272, pl. 1, figs. 15*).—Since the disease of calves called amakebe is East Coast fever, very many of the cattle in Uganda are almost immune to this disease. Owing to its nature, however, whereby animals recovered from the disease are no longer infective, some calves may escape attack and so remain susceptible. This occurs with the calves of the Sesse Islands, which when transferred as grown-up cattle to the mainland mostly die of East Coast fever. The carriers of East Coast fever—*Rhipicephalus appendiculatus* (or brown tick), *R. evertsi* (or red-legged tick), and *R. simus*—are all common in Uganda.

Contribution to the etiology of epizootic white scours in calves, T. KRAUTSTRUNK (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 3–4, pp. 256–263*).—The author has examined 73 calves during the last 2 years, 9 of which were affected with the so-called white scours. From their blood and the various organs he isolated a diplococcus (which had a great resemblance to the human pneumococcus) and in pure culture. The pathological findings, however, did not give a definite diagnosis.

In 8 of the cases there were apparently some changes on the umbilicus, which led the author to assume that the infection was through the umbilicus. Infection tests with small animals and calves (per os, per umbilicus, and intravenously) showed that the organism isolated was pathogenic for calves, and produced symptoms and pathological changes which were characteristic of white scours. The organisms retained their pathogenicity for calves for three-quarters of a year, and even after cultivating on artificial media. Immunizing tests were conducted, but the results were negative.

Veterinary notes.—Diseases of sheep, T. W. CAVE (*Jour. Southeast. Agr. Col. Wye, 1908, No. 17, pp. 401–421*).—Three papers are here presented, the first on "Struck" Sheep Experiments, in 1907–8; the second on An Investigation into the Nature and Cause of "Sway-back" in Lambs, and the third on Some Parasites of the Fourth Stomach and Intestines of Sheep and Cattle.

A disease of sheep in Tasmania, J. A. GILRUTH (*Vet. Jour., 66 (1910), No. 420, pp. 355–364*).—The author reports bacteriological investigations of the disease previously noted (E. S. R., 23, p. 1851).

I. Mediterranean fever experimentally produced in sheep. II. Passage of Micrococcus melitensis from the mother to the fetus in experimentally infected ewes, A. CONOR (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 13, pp. 678–680*).—Data presented show that sheep are susceptible to subcutaneous inoculation and to ingestion of cultures of *M. melitensis* and that the infection may be transmitted through their milk. An experiment reported shows that *M. melitensis* can traverse the placental barrier and pass from the mother to the fetus.

Notes on a protozoan parasite found in the mucous membrane of the abomasum of a sheep, J. A. GILRUTH (*Bul. Soc. Path. Exot., 3 (1910), No. 5, pp. 297–299, pl. 1*).—Cysts found by the author in the abomasum of Tasmania sheep are thought by Mesnil, to whom a specimen was submitted, to be a schizogonic stage in the evolution of some parasitic sporozoan of the sheep. Having found sarcosporidia to be very common in sheep, cattle, and goats in Australia, the author suggests the possibility of the cyst being a stage in the evolution of Sarcocystis. In an appended note Mesnil gives a brief account of investigations since made in his laboratory by Chatton, who found these cysts to occur

in nearly all of the sheep slaughtered at Paris abattoirs. Chatton thinks they represent a stage in the life cycle of *Sarcocystis tenella*.

Investigations in regard to kidney cysts in the hog, F. BRÜCKLMAYER (*Untersuchungen über Nierenzysten beim Schwein. Inaug. Diss., Hochsch. Dresden, 1910; rev. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 8, p. 383*).—These cysts are usually in the cortex and the medulla and usually contain a clear yellow odoriferous urine-like fluid, which in one instance had a specific gravity of 1.007, total solids 1.13 per cent, nitrogen 0.24 per cent, and water 98.87 per cent. This fluid was in most instances sterile, but at times contained cocci or coli bacteria but no other cellular elements. The walls of the cyst consisted of a many layered epithelium and fibrillar connective tissue. The parenchyma of the kidneys thus affected was, however, generally normal.

Contributions to the etiology of swine plague, P. FROSCH and R. BROLL (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 1-2, pp. 20-27*).—Injecting unfiltered and filtered lung extracts obtained from shoats affected with chronic swine plague (and which came from pens where no animals were present which had the characteristic intestinal lesions of hog cholera) into young pigs produced in a majority of instances typical hog cholera. In two cases the animals remained sound, and in another the results were doubtful. When lung extracts containing *Bacillus suisepticus* were injected hog cholera was produced in one instance but not swine plague, and in another swine plague and hog cholera.

It would thus appear that the ovoid bacterium which often inhabits the sputum of healthy hogs finds a haven in the lung tissue which has been attacked and weakened by the virus of hog cholera and there produces secondary changes. Vaccinating young shoats with hepatic, splenic, and renal extracts from animals with chronic swine plague produced no hog cholera.

Krafft's vaccine against swine plague, K. POPPE (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 26, pp. 509-511*).—Experiments on rabbits, guinea pigs, and mice with Krafft's vaccine against swine plague were of no value in protecting against *Bacillus suisepticus*.

Hereditary unsoundness in horses, S. S. CAMERON (*Jour. Dept. Agr. Victoria, 8 (1910), No. 5, pp. 328-347*).—Notes on evidence as to the hereditary character of certain pathological conditions constituting unsoundness in horses, principally ossification of the lateral cartilages (sidebone), furnished by examination of 2,636 cases are presented.

The refraction anomalies and the etiology of myopia in the eye of the horse, D. CZERWONSKY (*Beitrag zur Kenntnis der Refractionsanomalien und zur Aetiologie der Myopie des Pferdeauges. Inaug. Diss., Univ. Bern, 1908, pp. 38, figs. 3*).—The results of the opthalmological examination of 370 horses showed 49.1 per cent to be emmetropic and 50.9 per cent to be ametropic, 29.6 per cent being myopic and 21.3 per cent hypermetropic. Myopia was found to be more frequent in the cold-strained animals which had narrow but long, high orbits. On the other hand, warm-blooded animals which had orbits almost equal in breadth and length were either hypermetropic or emmetropic. Myopia, according to the author, is to be considered a question of race and inherited disposition.

Equine trypanosomiasis in the Canal Zone, S. T. DARLING (*Bul. Soc. Path. Exot., 3 (1910), No. 6, pp. 381-385; Amer. Vet. Rev., 37 (1910), No. 3, pp. 375-379*).—Under the name of *Trypanosoma hippicum*, the author describes a pathogenic trypanosome which was first found in the blood of mules received at Ancon, Canal Zone, from the United States in April, 1909.

The disease corresponds clinically with the swamp fever or infectious anemia, which occurs among horses in some sections of the United States. "The trypanosome appears and disappears with irregularity, appearing in numbers

of from one to a film to 6 or 10 to a field for a day or two, then disappearing for 6 or 7 days to reappear again during a febrile paroxysm." The disease is differentiated from surra, mal de caderas, and dourine by morphology, animal reactions and symptomatology. It is thought possible that the infection may be the same as that said to occur in the interior of Colombia, known as derrengadera.

The author has failed to find trypanosomes in the blood of several native horses examined, but these were found in all the affected animals. He expresses the thought that the infectious anemia which occurs in this country may be a trypanosomal disease in which trypanosomes are very sparse in the peripheral blood, as in dourine, but in which they may luxuriate in a tropical climate.

Investigations of dourine in eastern Prussia, E. Fröhner (*Monatsh. Prakt. Tierheilk., 20 (1909), Nos. 9–10, pp. 385–414, figs. 5; 11–12, pp. 481–495; abs. in Rev. Gén. Méd. Vét., 15 (1910), No. 174, pp. 338–340*).—Studies of 4 cases of chronic dourine in horses received from Rastenburg, Prussia, are reported upon. Examinations of the blood and tissues resulted in the finding of trypanosomes in the blood of but one of the horses.

A physico-chemical investigation of equine piroplasmosis, W. Frei (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 1–2, pp. 105–130, pls. 3*).—A contribution from the Transvaal Bacteriological Institute at Pretoria.

A case of hydrophobia in a Senegal dog, L. Teppaz (*Bul. Soc. Path. Exot., 3 (1910), No. 6, p. 351*).—The author reports what is thought to be the first case of this affection to occur in Senegal.

The dog's medical dictionary, A. J. Sewell (*London, 1907, 2. ed., rev., pp. 250, pls. 11, figs. 21*).—An encyclopedia of the diseases, their diagnosis and treatment, and the physical development of the dog.

Further observations with von Behring's protective vaccination and Tauruman vaccination, A. Eber (*Centbl. Bakt. [etc.], 1. Abt., Orig., 52 (1909), No. 3, pp. 389–406; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 46 (1910), No. 13–14, pp. 435, 436*).—The author reports results with bovovaccine in practice. He is still of the opinion (E. S. R., 19, pp. 784, 1083) that a positive tuberculin reaction three-quarters of a year after the last vaccination has the same significance as the same results from a herd which is tuberculous. On the other hand, a negative finding with the tuberculin test at this time is no absolute proof that the herd is not tubercular. With 14 bovines immunized according to von Behring the results were controlled by autopsy, and it was found that 10 were free from tuberculosis, while 4 were more or less tuberculous. From this he concludes that von Behring's method in itself is no certain protection against latent infection by the tubercle bacillus.

The results with Tauruman vaccination, while not conclusive, indicate that this vaccine also does not confer a lasting immunity in bovines.

On the occurrence of a form of fowl-septicemia in Calcutta, G. C. Chatterjee (*Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 1, pp. 1–4, fig. 1*).—"The micro-organism, which was separated from fowls dying of an epizootic disease occurring among the animals in the Medical College Laboratory, is found to have characters like that found in fowl septicemia observed in Europe and belongs to the Pasteurella group of micro-organisms. It differs from the *Bacillus oviscpticus* in certain minor points which suggest that it is a local variety of the organism. A vaccine was prepared from the organism which was found to protect healthy fowls from catching the infection."

About passive immunity in fowl cholera, O. Schöbl (*Centbl. Bakt. [etc.], 1. Abt., Orig., 51 (1909), No. 3, pp. 285–289*).—In order to establish whether or not by vaccinating with serum-bacteria active immunity is obtained, the author vaccinated mice and from the results concludes that mice thus treated

show an increased resistance toward a second infection. The resistance obtained with immune sera lasts, however, only for a period of 2 weeks and corresponds in this respect to the antitoxic sera. An active immunity was not obtained, and it is assumed that this is due to the strong action exerted by the immune serum upon the bacteria, making it impossible for the bacteria to multiply, even locally.

The author concludes that simultaneous vaccination is only efficient when the bacteria used for infection can provoke a stimulation upon the organism.

Simple poultry remedies, N. W. SANBORN ET AL. (*St. Paul, Minn., 1909, pp. 79*).—This book gives brief descriptions of the principal diseases of poultry and methods by which they may be cured or prevented.

The Tænioid cestodes of North American birds, B. H. RANSOM (*U. S. Nat. Mus. Bul. 69, pp. 141, figs. 42*).—Five species representing the genera Davainea, Rhabdometra, and Diorchis are described as new to science. A synopsis of the superfamily Tænioidea, which includes a key to genera and a list of all the species which have been reported as parasites of birds occurring in North America, follows. Nearly 40 genera and about 140 species are thus dealt with. A host list and an extensive bibliography are included in the work.

A contribution to the study of intrablobular parasites of lizards, H. DE B. ARAGÃO and A. NEIVA (*Mem. Inst. Oswaldo Cruz, 1 (1909), No. 1, pp. 44–50, pl. 1*).—Two species of Plasmodium, *P. diploglossi*, found in the blood of *Diploglossus fasciatus*, caught in Xerém, in the State of Rio de Janeiro, and *P. tropiduri*, discovered in blood smears of *Tropidurus torquatus* from the State of Minas Geraes, are described as new.

A study of the anatomy of Watsonius (n. g.) watsoni of man and of nineteen allied species of mammalian trematode worms of the superfamily Paramphistomoidea, C. W. STILES and J. GOLDBERGER (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 60, pp. 264, figs. 205*).—Three species of Fischœderius n. g., one each of Wellmanius n. g., and Cotylophoron n. g., and 9 of Paramphistomum are described as new to science. The 2 additional genera Watsonius and Pfenderius are erected.

The biochemical treatment of domestic animals, F. MEINERT (*Toledo, Ohio, 1908, pp. XI+130*).—Translated from the second German edition and provided with a glossary.

A treatise on veterinary therapeutics, M. KAUFMANN (*Traité de Thérapeutique Vétérinaire. Paris, 1910, 4. ed., pp. XVIII+817*).—A fourth edition of this work.

Pocketbook of veterinary medical practice, A. VON ROSENBERG (*Philadelphia, 1909, pp. 126*).—A small guide.

Diseases, ticks, and their eradication, A. THEILER (*Transvaal Dept. Agr., Farmers' Bul. 63, pp. 15*).—Previously noted from another source (E. S. R., 21, p. 786).

Dipping and tick-destroying agents, H. WATKINS-PITCHFORD (*Natal Dept. Agr. Bul. 17, pp. 24, pls. 2, figs. 2*).—A reprint of an account previously noted (E. S. R., 21, p. 687).

The circular dipping tank, without center pillar, and its advantages over other tanks, W. J. VAN DER MERWE (*Agr. Jour. Cape Good Hope, 36 (1910), No. 4, pp. 418, 419, fig. 1*).—A diagram, the dimensions, and particulars are furnished for a circular dipping tank without a pillar, which the author as a result of experience with all kinds of dipping tanks recommends as the most suitable and economical.

The bacteriological examination of disinfectants, W. PARTRIDGE (*London, 1907, pp. 66, figs. 4*).—This work discusses the ideal disinfectant, the fallacy of chemical methods, the carbolic acid coefficient, the principal factors to be recog-

nised in the Rideal-Walker method, apparatus and materials, the method of conducting the Rideal-Walker test, the choice of a test organism, the introduction of organic matter, further methods of bacteriological examination, the report of the disinfectant standardization committee, and the Rideal-Walker coefficient.

RURAL ENGINEERING.

Progress reports of experiments in dust prevention and road preservation (*U. S. Dept. Agr., Office Pub. Roads Circ. 92, pp. 32*).—Experiments conducted during the summer of 1909 are reported, together with supplementary observations on experiments previously noted (E. S. R., 21, p. 185.

From five trials at Washington, D. C., of waste sulphite liquors on a macadam driveway, it is concluded that "crude waste sulphite liquor in single applications has but little value for road treatment, but that the concentrated material may be classed as a temporary or semipermanent dust preventive and road binder. It is possible, however, that, if crude liquor were applied daily as in ordinary water sprinkling, its use would prove economical in localities where it is produced, and that the base would concentrate in the road and eventually become a valuable binder."

In seven tests at Youngstown, Ohio, to determine the best method of utilizing slag for road construction, the cost per square yard ranged from 43.34 cts. to 51.96 cts. with slag screenings, and was 50.21 cts. with open-hearth slag screenings, 48.18 cts. with slag screenings and lime, 61.31 cts. with slag screenings and sulphite liquor, and 68.45 cts. with refined coke-oven tar. Aside from a tendency in one trial with slag screenings and macadam to calk up or become crumbly under traffic, all these materials produced well-bonded roadbeds.

A series of 14 experiments was made at Ithaca, N. Y., in cooperation with Cornell University, for the purpose of ascertaining the relative value of different road binders under various conditions. The materials used were tar, oil, artificial asphalt preparations, brick, cement, and slag, and in experiments with the bitumens an attempt was made to try out all materials by both penetration and mixing methods. The total cost per square yard in each case was as follows: Penetration method, refined coal tar 45.92 cts., refined semiasphaltic oils 49.32 and 52.30 cts., semisolid refined semiasphaltic oil 43.32 cts., refined water-gas tar 46.95 cts., and refined water-gas tar (slag) 62.87 cts.; mixing method, refined coal tar 56.02 cts., and artificial oil asphalt 58.62 and 60.89 cts.; and for concrete, 74.77 cts. with cement concrete, 85.72 cts. with bitumen-coated cement concrete, and 48.41 cts. with ash cement concrete. All of the sections were in excellent condition when last inspected.

Supplementary observations made July 22, 1909, of the experiments started at Newton, Mass., about 11 months earlier, showed that the sections where a flush coat of bitumen had received 0.71 gal. per square yard of asphaltic preparation were in first-class condition, whereas those receiving only 0.54 gal. per square yard had required considerable patching or the surface was in rather poor condition. A section bound with residual oil was just beginning to pick up under traffic and the oil showed a lack of adhesiveness. Two sections on which refined water-gas tar had been used were in excellent condition, and one which had received a molasses-oil-lime combination had just started to pick up under traffic at a rather sharp curve.

From the observations made February 19, 1910, of the earth-asphalt road at Independence, Kans., it is concluded that "the asphalt mixed with the earth renders it fairly impervious to water; that it acts sufficiently well as a binder to prevent the washing of ruts on grades; that an asphalt having a melting point higher than that used should be employed if a satisfactory road is to be had in

the summer; that such an asphalt can not be spread upon and mixed with earth satisfactorily unless the earth is previously heated; that such a road is practically dustless save for dirt that may be carried upon it; and that, to prevent its being muddy just after a rain, 2 to 3 in. of from ¾-in. to 2-in. stone should be worked into the top."

Inspection of the four experiments made in Kansas with sand-clay construction showed that after 1 year's use these roads were in satisfactory condition. Brief notes are also given on the condition of the sections laid at Wayland, Mass., in 1907, with crude tar, tar preparations, and oil emulsions; on that in 1907 at Bowling Green, Ky., with Kentucky rock asphalt; and that in 1905 with tars and oils at Jackson, Tenn.

A preliminary report on some experiments in clearing logged-off land with a stump burner. A promising method for destroying stumps and logs, W. H. LAWRENCE (*Washington Sta. Bul. 93, pp. 3-20, figs. 3*).—This bulletin states the results of experiments in burning stumps and logs with a stump burner.

The burner consists of a 1½-horsepower gasoline engine with 13-in. fly wheel speeded to 650 revolutions per minute, and a circular fan provided with a patent wind distributor with 5 lines of 1½-in. hose attached. The machine was set to burn several stumps at a time. Fires were started in 2-in. auger holes and kept burning by means of air currents from the machine.

Rotten, water-soaked, and fungus-infested logs, stumps, and roots were successfully burned. The cost of burning green fir stumps 5 ft. in diameter 5 ft. above the ground averaged about $2.73 each. Most of the roots were burned to sufficient depth to permit plowing. Old fir stumps 9 ft. high and 2 to 2½ ft. in diameter were burned at an average cost of $1.56 each, while other fir stumps of the same height, 3½ ft. in diameter, sound but water-soaked, were burned as low as soil conditions would permit at an average cost of $1.70 per stump. The average cost of burning fir stumps 10 ft. in height and 5 ft. 2½ in. in diameter 3 ft. from the base was $2.80 per stump.

The reclamation of Minnesota's waste lands, G. A. RALPH (*Mo. Weather Rev., 38 (1910), No. 5, pp. 718-720*).—This article discusses the need, present status, and future outlook of drainage in the State as carried on by the State Drainage Commission.

On electro-culture, A. RINDELL (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 4, pp. 305-321, figs. 2*).—A discussion of the studies of Lemström and later investigators with regard to the influence of electricity on crop production.

The construction of concrete fence posts (*U. S. Dept. Agr., Farmers' Bul. 403, pp. 31, figs. 9*).—This article discusses the comparative advantages of concrete and wooden fence posts, materials for making concrete, molds for line posts, reenforcement of the posts, mixing the concrete, molding and curing the posts, building fences, and utilizing concrete posts for other purposes. Diagrams of gang molds are given for constructing both square and triangular posts. The cost of a 7-ft. triangular post is estimated at 29 cts., and of a straight square post of the same length at 32.25 cts. A warning is given against the purchase of post molds, or of local rights to sell or use such molds, from irresponsible parties.

[A model rural schoolhouse] (*Bul. First Dist. Normal School, Mo., 9 (1909), No. 1, pp. 9-15, fig. 1, dgms. 3*).—This bulletin presents and discusses three diagrams and a perspective view of a model building for rural schools, including a pressure water supply, sanitary toilets, furnace heat, manual training shop, agricultural laboratory, and sleeping room for the janitor. The estimted cost of the building is $1,600. Specifications for its construction are furnished free to Missouri school boards.

RURAL ECONOMICS.

Aids to prosperous farming, J. Long (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 151–167*).—This paper discusses the general conditions of farm management in Great Britain and makes suggestions for its improvement with a view to increasing the profits of the farm.

Among the suggestions the following are the most important: To keep the land free from weeds and destructive parasites, the use of suitable manures, selected seed, and leguminous crops, improved cultivation of the soil, the protection of the solid and liquid manure of the farm and its conveyance to the land as soon as possible, the use of lime, drainage of lands, the improvement of all classes of live stock, increasing the number of live stock kept on farms, the production of greater quantities of butter and cheese, more attention to poultry keeping and breeding for egg and meat production, and the extermination of live-stock diseases.

Farm publicity and selling, J. C. Marquis (*Northwest Hort., 23 (1910), No. 7, pp. 171, 172*).—This article discusses various forms of advertising and the advantages of each method to the farmer or stock raiser for the profitable disposal of his products.

The need of farmers' associations and what they should do for the development of agriculture, R. Palma (*Philippine Agr. Rev. [English Ed.], 3 (1910), No. 4, pp. 211–217*).—This paper discusses the benefits to agriculture in the Philippines which might be expected from the organization of cooperative societies, such as in the maintenance and improvement of soil fertility, the introduction of new crops and better culture of those already grown, the cultivation of several crops in one field, the formation of mutual credit societies, the stimulation and improvement of the condition of farm laborers, and the organization of agricultural exhibitions.

Farmers must organize, J. H. Worst (*N. Dak. Farmer, 11 (1910), Nos. 11, pp. 23, 24; 12, pp. 5–7*).—This is an address before the Farmers' Union at St. Louis, May 2–7, 1910, setting forth the advantages of cooperation in securing profitable returns to the farmer for his labor, and encouraging farmers to study the economic side of agriculture for the purpose of devising means for the most effective cooperation among themselves. The formation of a national cooperative organization is recommended

Cooperative organization in agriculture, C. Douglas (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 1–16*).—This article discusses the economic advantages which have been secured by the cooperative purchase of farm supplies and in the marketing of such products as eggs, fruits, dairy products, bacon, live stock, etc.; the financial benefits to farmers of mutual credit societies; the development of agricultural organization in Denmark, Germany, France, Belgium, Italy, and the United Kingdom; the relation of cooperation to the prosperity of small farmers; and the general effects of cooperation in improving the quality of farm products and stimulating rural life through its educational and social features.

Danish cooperative methods being tried in Ontario (*Nor'-West Farmer, 29 (1910), No. 13, p. 865*).—This is an account of the rules and regulations of organizations formed in Peterboro County, Ontario, for the cooperative marketing of eggs and other poultry products. An outline is given of the Danish method of marketing eggs, the economic and financial advantages of the system, and the organization of the Peterboro circles on the Danish plan.

Cooperative agricultural societies in the United Kingdom (*Jour. Bd. Agr. [London], 17 (1910), No. 2, pp. 140–143*).—Returns of the productive, distribu-

tive, and cattle insurance societies for 1908, in comparison with similar data for the 10 preceding years, are reported and discussed.

Scottish Agricultural Organization Society (*Jour. Bd. Agr. [London], 17 (1910), No. 2, pp. 138–140*).—The returns show a total of 39 affiliated societies in 1909, a gain of 16 over the preceding year. The milk and poultry societies were especially prosperous, and the members of district societies were substantially benefited in the price and quality of seeds, manures, feeding stuffs, implements, and other requisites purchased, and in the sale of produce.

Assistance to farmers, H. A. HIME (*Natal Agr. Jour., 14 (1910), No. 5, pp. 595–599*).—The text of the law which provides for loans to farmers in Natal for erecting fences and dipping tanks on their farms is reported and discussed.

Loans for dipping tanks are limited to £100 and for fencing to the supply of the material only. The loans are repayable, together with interest thereon at 5 per cent per annum, by 13 equal yearly installments not including the first year after the loan is made, except that any borrower may pay off all his liability with interest to date of payment at any time he may wish to do so.

Cooperative credit (*Indian Agr., 35 (1910), No. 6, pp. 176, 177*).—This article discusses the rapid development of agricultural cooperative credit in India, the returns showing a membership of 184,000 in 1908–9 as compared with 90,000 in 1906–7, and nearly a fourfold increase in capital and expenditures.

The future success of the movement in India is regarded as depending upon the successful solution of the problems of finance and supervision. The value of cooperation in solving the former is believed to be firmly established, while the most satisfactory solution of the latter is believed to consist in the further extension of the cooperative principle "by the organization of societies as they increase in number into local unions and the federation at a later stage of these local unions into central unions, the ideal to aim at being that the unions should not only finance their own societies but also supervise them and encourage the further growth of the movement in definite areas."

The Agricultural Bank of Egypt (*Indian Agr., 35 (1910), No. 6, pp. 165, 166*).—This article discusses the present status of agricultural credit in Egypt and its bearing on the situation with which the Agricultural Bank of Egypt is confronted. The outstanding loans of the bank to Egyptian farmers amount to about $40,000,000 distributed among 238,000 debtors, "and the proportion of arrears to the amount of annuity which fell due to be collected during the year rose from 3.1 per cent in 1906 to 17.7 per cent in 1909." The inability of the debtors to meet their obligations is attributed in part to the loans having been expended for unproductive purposes.

The experience of the Egyptian bank is regarded as an argument in favor of establishing cooperative credit associations which teach the borrower to be thrifty and self-reliant, and it is now proposed to form in Egyptian villages cooperative organizations with which the bank can deal directly.

Concerning the economic condition of farm laborers in the Netherlands, E. DEERSMAN (*Cultura, 22 (1910), Nos. 257, pp. 17–20; 258, pp. 64–74; 259, pp. 131–135; 260, pp. 174–180; 261, pp. 249–261; 262, pp. 294–300; 263, pp. 352–361*).—A detailed study of the physical, economic, and social conditions affecting the life of farm laborers in the Netherlands.

[Wages of agricultural laborers in Hungary], E. HOWARD (*Diplo. and Cons. Rpt. [London] Ann. Ser., 1910, No. 4429, pp. 20, 12*).—The rates of wages paid to men, women, and children engaged in agriculture in Hungary during 1908, as compared with similar data for 1901, together with statistics of the number and classes of the agricultural population, are presented and discussed. The custom of providing laborers with food is gradually passing away, and the figures presented show that wages have been increased accordingly.

Accidents at agricultural labor, S. Bassi (*Gli Infortuni sul Lavoro Agricolo. Milan, 1909, pp. XV+413*).—This volume discusses the general problem of insuring farm laborers and others engaged in agricultural pursuits against accidents, and gives a history of legislation regarding workmen's insurance in France, Austria, Germany, England, and Belgium, which includes the legislation in these countries regarding the insurance and indemnification of all classes of farm labor. The book also discusses the problem in its relation to conditions in Italy, with an account of the legislative and other means that have been put in operation for the solution of the problem.

The farmer's profits and the speculation in land, R. S. Lanier (*Amer. Rev. of Reviews, 41 (1910), No. 245, pp. 725–730*).—This article calls attention to the relation of the recent high prices received by farmers for staple farm products to land speculation by farmers and others. Emphasis is laid on the economic danger which springs from the rise in land values which high prices and speculation have brought about in the Middle West and Canada.

The cost of production of the most important field crops, W. H. Howard (*Die Produktionskosten unserer wichtigsten Feldfruchte. Berlin, 1908, pp. 84*).—Data on the cost of production in Germany of wheat, rye, barley, oats, potatoes, and sugar beets, as ascertained from 140 farms, covering periods ranging from three to five years, are tabulated and discussed in this volume.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 12 (1910), Nos. 7, pp. 49–56, fig. 1; 8, pp. 57–64, figs. 2*).—Statistics on the condition and acreage of crops in the United States and foreign countries, the farm values and range of prices of agricultural products, and monthly receipts of eggs and poultry in the chief markets of the United States are presented and discussed in each of these numbers. Number 8 also contains estimates of the land values and size of fields devoted to wheat and corn in the United States.

AGRICULTURAL EDUCATION.

Agriculture in Belgium from 1885 to 1910 (*L'Agriculture Belge de 1885 à 1910. Louvain, 1910, pp. XI+197, pls. 48*).—This is a collection of monographs published on the occasion of the twenty-fifth anniversary of the organization of the service of "agronomes" in Belgium. It contains an account of the organization of this service, the duties and qualifications of "agronomes," graduates of agricultural colleges engaged in extension work for the State, and the results obtained in the various provinces by their scientific and systematically organized work, as shown by increased yields in field and garden crops and fruits, the more extensive use of fertilizers and agricultural machinery, improvement of horses and live stock, in dairy methods, poultry culture, etc. The agencies employed to bring about these results, such as the teaching of agriculture in the primary schools, agricultural and special courses for adults, courses for farmers' wives, traveling agricultural domestic science and dairy schools, lectures, written and oral consultations, experiment and demonstration fields and gardens, farmers' institutes, women's institutes, agricultural libraries, associations, expositions, etc., are described.

A chapter from the early history of the college, J. D. Walters (*Industrialist, 36 (1910), No. 29, pp. 451–456*).—This is an article on the early history of the Kansas State Agricultural College, prefaced by a brief account of the beginnings of agricultural education in Massachusetts, Michigan, Maryland, and Pennsylvania.

Cosmopolitan high schools v. separate occupation schools, J. H. Reynolds (*So. Atlantic Quart., 9 (1910), No. 3, pp. 275–279*).—This article is mainly an argument in favor of the incorporation of agricultural and other industrial

courses with the work of the ordinary public high school. It is based on the following premises: (1) This is feasible: (2) it meets the demands of the age; and (3) it is democratic. The author believes that the principle of educational segregation if carried to a wide development in the interest of all classes of industrial workers would become insupportable at public expense. He concludes that "if separate [agricultural] schools are to be provided, with the light before us no State would be justified in establishing more than three or four for experimental purposes."

Agriculture in the public schools, H. D. Groves (*Rpt. W. Va. Bd. Agr., 1910, No. 18, pp. 771–774*).—The purpose of this article is to show the importance of agriculture as a public school study. The author holds that as the schools can teach only a limited portion of the experience of the race, that portion which is of most worth must be selected for formal instruction. He believes that agriculture is highly educative, interesting, inspiring, and intensely practical, and that teachers may successfully begin the teaching of it without knowing "everything about agriculture," and later acquire the best preparation possible.

The place of forestry in general education, H. A. Smith (*Forestry Quart., 8 (1910), No 2, pp. 191–195*).—A paper read at the conference of Forest Schools, Washington, D. C., December 30 and 31, 1909.

After noting the increasing extent to which the subject of forestry is gaining educational recognition "from the nature-study work of the primary schools to the elective courses of the student approaching his degree," the author proceeds to develop an argument in favor of the cultural value of forestry, basing this upon the advancing educational conception of what constitutes real culture, including the element of moral and civic obligation.

A suggested course in household administration, Gwendolyn Stewart (*Jour. Home Econ., 2 (1910), No. 2, pp. 226–232*).—This article presents a suggested four-year course in household administration, and reports the results of correspondence in regard to home economics courses at Bryn Mawr, Mount Holyoke, Radcliffe, Vassar, and Wellesley colleges, the Woman's College of Baltimore, and in the home economics departments of the universities of California and Missouri.

Nature study and gardening for rural schools, G. W. Carver (*Alabama Tuskegee Sta. Bul. 18, pp. 3–23, figs. 11*).—This bulletin introduces a novel feature in children's garden work in the form of a partnership contract between the two or three responsible for care of each plat, thus developing the social and business abilities of the workers. Other features not always found in such work which are described are seed testing, simple bookkeeping, insect remedies, homemade fertilizers, a monthly planting calendar, tree planting, lawn making, and window boxes.

Small gardens for small gardeners, Lillian C. Flint (*Chicago, 1910, pp. 118, figs. 50*).—This gives a series of chapters on plants adapted to children's garden work, with particular emphasis on the wild flowering plants that can be successfully introduced into the home or school garden.

Exercises in elementary agriculture for Maine rural schools, J. E. McClintock and E. D. Waid (*Augusta, Me.: State Ed. Dept., 1910, pp. 15*).—This publication contains 21 exercises for school work, chiefly on elementary soil physics and seed germination. The equipment needed is indicated for each exercise, and references to publications bearing on the topic studied are given.

Field zoology, Lottie E. Crary (*Philadelphia, 1910, pp. XII+364, figs. 117*).—This volume, one of a series to be published, deals with insects and birds of the field. It is designed as a text-book for high schools, and should prove serviceable as a guide to teachers and classes in secondary agricultural

schools, as some attention is given to the economic as well as the scientific aspects of the subjects treated.

Progress in agricultural education extension, J. HAMILTON (*U. S. Dept. Agr., Office Expt. Stas. Circ. 98, pp. 12*).—This circular discusses briefly the growth of sentiment in favor of a more definite organization of agricultural extension work to its culmination in the establishment of the Section on Extension Work of the Association of American Agricultural Colleges and Experiment Stations. Typical forms of extension organization in Iowa, Indiana, and Ohio are described and a list is given of the 26 States in which definite extension departments have already been organized. The most pressing need in agricultural extension education is said to be "the systematizing of its methods" and the development of definite courses of instruction in movable schools, public rural schools, and normal schools.

Suggestions to purchasers of agricultural books, ANNA M. SMITH (*Univ. Minn., Dept. Agr. Ext. Bul. 2, pp. 16*).—This bulletin is one of the Minnesota Farmers' Library series and contains a list of books on general agricultural economics, special farm topics, and books for general reading, with prices and the addresses of publishers. There is also a selected list of the free publications of this Department on botany, farm crops, dairying, drainage, entomology, farm buildings and machinery, fertilizers, feeds and feeding, food and cooking, forestry, horticulture, irrigation, live stock, plant diseases, poultry, soils, veterinary, weeds, zoology, and miscellaneous topics. Titles of similar publications issued by the Minnesota Station are also included, with the addresses of the Members of Congress from Minnesota and of the directors of experiment stations in 13 other States.

MISCELLANEOUS.

Annual Report of Florida Station, 1909 (*Florida Sta. Rpt. 1909, pp. XC+XIV, figs. 40*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1909, a list of the publications of the year, a general review of the work of the station during the year, departmental reports, and a list of the periodicals received by the station. Most of the experimental work reported is abstracted elsewhere in this issue.

Nineteenth Annual Report of Washington Station, 1909 (*Washington Sta. Rpt. 1909, pp. 15*).—This contains the organization list, a report of the work and publications of the station during the year, and a financial statement for the fiscal year ended June 30, 1909.

Twenty-eighth annual report of the control station at the Museum of Trades and Agriculture at Warsaw for 1908, Z. A. ZELINSKI (*Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *10* (*1909*), *No. 4, pp. 489–501*).—A report is given of the work and experiments of the station during 1908.

Monthly Bulletin of the Department Library, May, 1910 (*U. S. Dept. Agr., Library Mo. Bul., 1* (*1910*), *No. 5, pp. 105–138*).—This contains data for May, 1910, as to the accessions to the Library of this Department and the additions to the list of periodicals currently received.

Experiment Station Work, LVII (*U. S. Dept. Agr., Farmers' Bul. 405, pp. 32, figs. 13*).—This number contains articles on the following subjects: A perfect stand of corn, protection of seed corn from burrowing animals, clover-seed production in the Northwest, supplementary home-grown feeds for hogs in the South, fleshing horses for market, fertility and hatching of eggs, marketing of eggs, and cement silos.

NOTES.

Arizona Station.—Recent appointments include Alexander McOmie, a graduate of the Utah College, as assistant agriculturist, and Charles H. Clark, botanist of the North Dakota substation at Dickinson, as assistant plant breeder. The former will give special attention to dry farming problems and the latter to alfalfa investigations. Dr. A. E. Vinson has been granted 6 months' leave of absence and is at present in Berlin continuing his studies on the action of enzyms in ripening fruits.

Arkansas University.—C. Christopher has been appointed instructor in animal husbandry.

Delaware College and Station.—A terra cotta hollow block silo of the Iowa type, 40 by 16 ft., and reenforced with one-quarter inch wire cable, is being erected on the college farm. Herman D Eggers, jr., assistant chemist in the station, has resigned to accept a commercial position in St. Louis, Mo.

Florida University and Station.—The equipment and apparatus of the station have been installed in the new station building. This building is to be devoted almost entirely to station work, with two rooms for the extension department.

Fifteen school children's clubs have been organized by the extension department in Alachua County, and several in various other counties. The department is also actively cooperating in a state fair to be held at Pensacola, November 7–12, and in the various county fairs.

R. N. Wilson, assistant in extension work, resigned September 1 to become associate professor of chemistry in Trinity College, and has been succeeded by A. P. Spencer, director of agriculture in the Fifth Congressional Agricultural High School, Elk Creek, Va.

Georgia College and Station.—A. G. G. Richardson has resigned the professorship of veterinary medicine in the college, and has been succeeded by Dr. W. M. Burson, of the Bureau of Animal Industry of this Department. In the station H. P. Lykes, a graduate of Clemson College, has been appointed animal husbandman, vice P. N. Flint, whose resignation has been previously noted.

Illinois Station.—H. P. Rusk, assistant in animal husbandry in the Indiana Station, has accepted an associateship in beef cattle husbandry. Thomas Bregger has been appointed assistant in plant breeding.

Iowa College and Station.—E. W. Stanton, professor of mathematics and political economy, has been designated as acting president. Percy E. Brown, assistant chemist of the New Jersey Stations and a graduate student in Rutgers College, has been appointed assistant professor in charge of soil bacteriology. The associate professorship of animal husbandry made vacant by the resignation, previously noted, of Wayne Dinsmore, has been filled by the appointment of Clare N. Arnett, instructor in animal husbandry in Purdue University. F. W. Allen has been appointed instructor in horticulture.

In the station Dr. Arthur W. Dox, of the Connecticut Storrs Station, has been appointed chemist, and John M. Evvard, formerly of the Missouri University and Station, experimentalist in animal husbandry.

The equipment in the new agricultural building has been fully completed. The total cost of building, furniture, and equipment is about $375,000. Very complete and extensive equipment has been provided for the instruction and experimental work in soils, soil bacteriology, farm crops, animal husbandry,

horticulture and forestry, and agricultural chemistry in this building, besides quarters for the agricultural extension department and an assembly room with a seating capacity of one thousand.

Kansas College and Station.—R. K. Nabours, of the department of zoology, University of Chicago, has been appointed instructor in zoology and assistant zoologist, vice T. H. Scheffer, whose resignation has been previously noted. Harry Evans has resigned as assistant entomologist to accept a position at the Ohio Station.

Maine University.—Dr. Robert J. Aley, state superintendent of public instruction in Indiana, has accepted the presidency of the university and will take office December 1. Leon S. Merrill, dairy instructor in the state department of agriculture, has been appointed head of the extension department.

Massachusetts College and Station.—Following the retirement of Prof. C. H. Fernald, as previously noted, Dr. H. T. Fernald has been appointed acting director of the graduate school. F. F. Moon, of the New York State Department of Forestry, has been appointed associate professor of forestry, and Alvah J. Norman, of the Maryland College and station, has been appointed instructor in pomology, his duties including both instruction and extension work. The entering class numbers about 160, an increase of 25 per cent.

Carl D. Kennedy, assistant chemist in the department of plant and animal chemistry in the station, resigned September 1, and has been succeeded by Clement L. Perkins.

Minnesota University.—A conference on agricultural education was held at the university July 29–30, in which representatives from the university, the college of agriculture, the agricultural high schools at Crookston and Morris, the Putnam schools, the state normal schools, and the state department of education took part. There were also addresses by Dean C. F. Curtiss, of the Iowa College, Dean J. H. Shepperd, of the North Dakota College, and D. J. Crosby, of this Office.

The object of the meeting was to formulate a plan for the future development of agricultural instruction in the State. As a means toward this end resolutions were adopted favoring the gradual extension of state aid to public high schools, graded schools, and consolidated schools for departments of agricultural instruction; appropriations for state aid to encourage the consolidation of small rural schools; increased funds for state teachers' training schools; liberal maintenance and equipment funds for institutions established for the general training of teachers; a limited number of agricultural schools like those at St. Anthony Park, Crookston, and Morris, with strong faculties and adequate equipment for advanced practical agricultural training; training in industrial arts in graded and high schools, supplemented by continuation schools; and a state appropriation to be used as premiums for a state industrial contest for boys and girls.

North Carolina College and Station.—J. G. Hall resigned as instructor in vegetable pathology in the college and assistant in plant diseases in the station September 1, to become associate professor of botany and forestry in Clemson College, and will be succeeded by Guy West Wilson, of Upper Iowa University. Other appointments include Joseph Daggett Cecil, V. M. D. (University of Pennsylvania) as animal pathologist to the station, beginning September 1, and J. C. McNutt, assistant animal husbandman of the New Hampshire College and Station, as dairy husbandman in the college and station, beginning September 1.

Ohio State University and Station.—The following assistants have recently been appointed in the university: George A. Livingston, of the department of agronomy of the Iowa College, in farm crops; George F. E. Story, Ohio State

University, 1910, in animal husbandry; E. F. Rinehart, Ohio State University, 1910, in dairying; G. A. Bricker, University of Illinois, 1910, in agricultural education; and H. E. Eswine and C. D. Steiner in agricultural extension.

In the station J. S. Houser, assistant entomologist, has been granted a year's leave of absence for postgraduate study at Cornell University; Walter O. Glover has been appointed assistant botanist, and George R. Eastwood assistant in animal husbandry. E. S. Guthrie, H. C. George, L. T. Bowser, W. F. Pate, H. J. Christoffer, and C. B. Evans are no longer connected with the station.

Oregon College and Station.—Recent appointments include E. G. Peterson as professor of bacteriology and bacteriologist; G. R. Sampson, of this Department, as instructor in animal husbandry; H. F. Wilson as assistant for research in entomology; Dr. H. H. Severin, of the University of Wisconsin, as assistant for research in botany; F. E. Rowland as instructor in chemistry; and F. R. Brown and R. W. Rees as instructors in horticulture. A. L. Peck, assistant professor of landscape gardening, has resigned to engage in commercial work.

Porto Rico Sugar Producers' Station.—D. L. Van Dine, of the Bureau of Entomology of this Department, has been appointed entomologist, with headquarters at San Juan.

Rhode Island Station.—The new poultry hospital for use in connection with the study of poultry diseases is nearly completed. This hospital, with its modern equipment, is believed to be the first of its kind to be erected for this special purpose in this country and probably in the world.

A. L. Whiting, assistant agronomist, has accepted a fellowship in agronomy at the University of Illinois.

Utah Station.—Leon D. Batchelor, instructor in horticulture in Cornell University, has been appointed horticulturist, and has entered upon his duties.

Virginia Station.—Dr. E. A. Back, of the Bureau of Entomology of this Department, has accepted an appointment as station entomologist and entomologist to the state crop pest commission, and will enter upon his duties about November 1.

Washington College and Station.—A farming demonstration boat was operated on Puget Sound, August 10–25. The boat was chiefly equipped to demonstrate improved forage crops and better methods of dairying and fruit production. There was an average attendance of 155 at each of the 24 stops.

Better farming special trains with special demonstrations of methods of dry farm tillage, fruit growing, and diversified farming in eastern Washington were operated over railway lines in eastern Washington early in July. Of the total attendance of 9,600 at the 41 stops, at least 75 per cent were adult farmers, showing that the interest in this kind of extension work in the territory which was traversed is chiefly among the actual farming people.

W. H. Hein has resigned as assistant horticulturist of the station and has been succeeded by E. C. Langlois, a graduate of the Iowa College. A. B. Nystrom, assistant in dairy husbandry at the Kansas College, has been appointed instructor in dairying in the college, and entered upon his duties September 15.

West Virginia University and Station.—E. D. Sanderson has accepted the position of dean of the college of agriculture and entered upon his duties September 1. In the station Charles M. Gifford, assistant in plant pathology in the Vermont University and Station, has been appointed assistant in bacteriology.

Wyoming University and Station.—The college of agriculture has just obtained from Nova Scotia a herd of 20 registered dairy cattle, including Jerseys, Canadian Holsteins, and Ayrshires.

The station is making preparations to take up investigations on the life history of the sheep tick. The sheep breeding experiment which has been car-

ried on in cooperation with the Bureau of Animal Industry of this Department has been discontinued.

A project has been outlined and work is in progress upon the effect of alkali on cement and structural material. An interesting discovery is that sodium sulphate, for a period of one month at least, gives cement greater strength.

Ontario Agricultural College.—At the recent commencement of McMaster University, Toronto, President G. C. Creelman was the recipient of the honorary degree of doctor of laws. John Buchanan, associate professor of field husbandry, has resigned to accept the position of park commissioner in Calgary, Alberta.

Necrology.—Samuel B. Green, in charge of the horticultural and forestry work of the Minnesota University and Station since 1888, died suddenly July 11, from a stroke of apoplexy while directing work in forestry at the Lake Itasca Forest School.

Professor Green was born in Chelsea, Mass., September 15, 1859, and was graduated in 1879 from the Massachusetts Agricultural College, where he was employed for a short time as superintendent of the horticultural department. After several years in commercial work he went to Minnesota, where during his long service he organized and developed with great enthusiasm and untiring energy the extensive horticultural and forestry work of the university and station. Since 1907, when the state legislature made an appropriation for fruit breeding experiments, he had built up outside the city of Minneapolis the largest station for fruit breeding in existence—a product of his own plans and activity. In recent years he had also given much attention to the work in forestry, and upon the recent reorganization of the forestry courses into a distinct college he had been selected as dean. He served as president of the State Horticultural Society in 1907, and had been associate editor of *Farm and Fireside* since 1888. Among his publications were a large number of bulletins and reports from the station and the following books, some of which received eight and nine editions: Amateur Fruit Growing (1894), Vegetable Growing (1896), Forestry in Minnesota, Principles of American Forestry, and Popular Fruit Growing (1909).

Another of the organizers of instruction and experimental work in horticulture passed away September 9, at Howell, Mich., where Welton M. Munson died at the age of 44 years. Professor Munson was a native of Michigan, and was graduated from the Michigan Agricultural College in 1888. In 1892 he received the master's degree from the same institution, and in 1901 the Ph. D. degree from Cornell University. He began his work in horticulture at Cornell University in 1889, serving as assistant in horticulture till 1891, when he assumed charge of the newly established department of horticulture in the Maine College and Station. In 1907 he accepted the position of professor of horticulture and horticulturist in the West Virginia University and Station. For some time he had been handicapped by failing health and formally resigned in June, 1910. He was the author of a considerable number of bulletins of the Maine and West Virginia stations, contributing especially in late years to problems in orcharding.

John A. Craig, one of the pioneers in animal husbandry instruction and formerly director of the Texas and Oklahoma stations, died August 9, at the age of about 46 years. Professor Craig was of Canadian birth and training, studying at the Ontario Agricultural College and the University of Toronto, and beginning his work as the editor of the *Canadian Live Stock Journal*. In 1890 he was chosen to head the first college department in this country to be devoted entirely to animal husbandry, just established at the University of Wisconsin, and he occupied this position for 7 years, when he accepted an appointment as

professor of animal husbandry and animal husbandman in the Iowa College and Station.

On account of ill health, from which he suffered throughout his life, he was obliged in 1901 to seek a warmer climate and took up ranch life in Texas. The following year he accepted the directorship of the Texas Station, also serving in the college as lecturer in animal husbandry. In 1906 he again retired to his ranch near San Antonio, but in 1909 became director of the Oklahoma Station and retained this position until his final retirement in May, 1910.

In one of the many appreciative tributes that have appeared since his death, *Breeder's Gazette* speaks of Professor Craig as the "father of the technical art of live stock judging in America." In connection with his work in Wisconsin and Iowa he gave particular attention to the development of the score card system, and while at the latter institution offered what is believed to have been the first farmers' stock judging contest. He was widely known as a judge of live stock, and his experience gained in scores of show rings was in great demand. His text-book, Judging Live Stock, published in 1901, has received several editions and remains one of the standard American works on the subject.

Albert E. Leach, chief of the food inspection laboratory of this Department at Denver, Colo., died August 22 in that city at the age of 46 years. Mr. Leach was a graduate of the Massachusetts Institute of Technology and had served from 1892 to 1907 with the Massachusetts State Board of Health, resigning as chief analyst to enter the service of this Department. Throughout his career he gave much attention to devising improved methods of analysis and served several times as associate referee for the Association of Official Agricultural Chemists in saccharin products and dairy products. He was a pioneer in making color tests of milk, and did original work on vinegars and glucose determinations in sirups. His well-known manual, Food Inspection and Analysis, was published in 1904, with a revised and enlarged edition in 1909.

National Association of Stallion Registration Boards.—At a meeting held at the Union Stock Yards, Chicago, August 17, at which delegates were present from seven States, a national association of stallion registration boards was organized, with the following officers. President, A. S. Alexander, of Wisconsin; vice-presidents, H. R. Smith, of Nebraska, W. H. Wilson, of South Dakota, and T. M. Smith, of Illinois; secretary-treasurer, R. J. Kinzer, of Kansas; and additional member of the executive board, W. B. Richards, of North Dakota. Several committees were also appointed to report at the next meeting, to be held in Chicago December 2, in connection with the International Live Stock Exposition.

It is announced that the work of the association will include efforts to secure uniform legislation in the different States, the improvement and proper supervision of studbook registration and the suppression of fraudulent and superfluous studbooks, the advocacy of the general use of improved breeding stock, and the general betterment of horse breeding throughout the country.

Prospective Meetings of Agricultural Workers in Washington.—Announcement is made of the prospective meetings in Washington of the Association of Official Agricultural Chemists from November 10–12, the Society for the Promotion of Agricultural Science November 15, the American Association of Farmers' Institute Workers from November 14–16, and the Association of American Agricultural Colleges and Experiment Stations from November 16–18.

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EXPERIMENT STATION RECORD.

VOL. XXIII. NOVEMBER, 1910. No. 6.

A recent gathering of considerable interest to workers in agricultural science was the agricultural libraries' round table, held in conjunction with the annual conference of the American Library Association the past summer at Mackinac Island, Mich. Represented at this meeting were various agricultural college and experiment station libraries, the libraries of this Department and this Office, state libraries and other extension agencies engaged in farmers' library work, and others interested in the collection and circulation of agricultural literature.

The programme included both papers and conferences, and while some of the subjects dealt with the more technical details of library management, others discussed the broader phases of the relation of these libraries to other agricultural agencies. Among the topics to be considered were the means of popularizing agricultural literature, the place of agricultural literature in the general reference library, the instruction of students in the use of agricultural and other scientific literature, the selection and preservation of agricultural periodicals, bibliographical and other aids to agricultural literature, and similar questions of wide interest and significance.

The meeting is believed to have been the first attempt to assemble as such the scattered but rapidly increasing number of workers in the comparatively new field of agricultural library science. As was to be expected, it served to reveal some of the problems common to those in attendance and the advantages to be secured by their discussion. At the close of the conference, in response to a general desire for future meetings, steps were taken looking toward the permanent organization of an agricultural library section of the American Library Association. Should these efforts be attended with success another helpful auxiliary to agricultural science, therefore, gives promise of being added to the long list of specialized associations which have come into being within the last few years.

The inauguration of this undertaking and the interest which is being manifested in its development renders even more than usually pertinent a discussion of the experiment station library and of the

ways in which its efficiency may be increased. Already there are indications of an increasing realization by the stations as a whole of the importance of their library as a factor in their work, but in too many cases it may even yet be questioned if the library has received its full measure of sympathetic attention.

Upon the usefulness of a library well equipped and properly cared for to the work of an institution which has for its fundamental purpose research, there would seemingly be as little need to dwell as on the necessity of supplying to the investigator his apparatus or the other equipment for his work. In many of the stations this is now realized and great liberality is shown in the purchase of the scientific and technical books and journals required, and in providing for their care by suitably trained assistants. Others, however, have hesitated at expenditures which seem to yield chiefly an indirect return, or have perhaps overestimated the difficulties in the development of the library.

The gradual building up of such a library as the station ordinarily requires need not involve heavy cash outlay, especially for the class of literature with which the station worker has especially to deal. There is now a great accumulation of public documents to be obtained by libraries without charge, such as the publications of this Department and of the state experiment stations, these two sources alone now numbering fully twelve thousand publications. Current files of the leading agricultural papers of the United States and publications of agricultural, horticultural, dairy, and kindred societies may often be acquired by exchange or by gift, as may also many publications of departments of agriculture and of agricultural schools and societies in foreign countries.

Once the necessary reference books have been obtained the cash outlay may be therefore largely applied for scientific periodicals, review journals, and special works made necessary for specific investigations. Even these may often be curtailed. One very effective way is by interlibrary lending, a practice which is growing more and more common in this country and which gives opportunity of consulting works which are needed for only a short time or are too expensive to justify outright purchase. Among others, the Library of Congress has a liberal system of loans to responsible libraries at a distance, and the Library of this Department is frequently able to loan certain classes of publications under reasonable restrictions. There are also possibilities in the cooperative purchase of books and in the exchange of duplicate collections.

The mere accumulation of publications, however, by no means constitutes a library. Without systematic arrangement and careful classification and cataloguing the collection can be little but a cumberer of the ground, and without constant oversight and attention

even the best ordered library must speedily degenerate into chaos. The station library in particular, irrespective of such administrative details as its organization as a part of the college library, its maintenance as a separate entity, or its partition into departmental collections, needs careful supervision because of its peculiar nature. Merely from the business standpoint, now that the stations are expending, as in recent years, an average of about five hundred dollars annually for books, periodicals and binding, it is easy to see that in even a few years the library comes to represent a considerable investment, justifying the careful preservation of its peculiarly perishable material and its housing with greater regard to the hazard from fire and other losses than it commonly receives.

With a large and ever-increasing library of this sort in constant use, there must be regular and systematic attention. The conditions render desirable the employment of a librarian, trained if possible. The usefulness of the library will often depend very largely upon this one factor. Even in the acquisition of the material the services of some one who can make it his special business is well nigh indispensable. It is doubtful if there is yet a full realization of the importance of securing and preserving complete files of the publications which constitute the bulk of the station library. In the case of public documents the impression is still widespread that such documents if lost can be easily replaced, and in consequence too often their acquisition is neglected, or once obtained they are not properly cared for. This is evident from the conditions frequently found and from the many requests for back numbers which come to this Department.

As a matter of fact it is well known to all who have had occasion to attempt such work that the replacing of these documents is not only difficult but in many cases well nigh impossible. Editions are small and soon exhausted; and such documents are not as easily acquired through book dealers as most other kinds of publications.

Thus in spite of very great efforts by this Office and others to secure an absolutely complete set of the publications of the experiment stations in this country, it is improbable that any such set exists or can ever be brought together. A similar condition exists with reference to the publications of this Department. In both cases there are sets substantially complete, but those in the possession of many colleges and stations are quite far from it. Of necessity in dealing with publications issued at irregular intervals and oftentimes in unnumbered series and even undated, there must be constant watchfulness and persistence to obtain material and preserve it. The current lists of publications of the stations and this Department now make it feasible to follow this matter systematically.

When the library has installed at its head an assiduous collector and an efficient caretaker there has been a long step forward, but the

returns will be even greater if the librarian can be more than these. It is as true as it is unfortunate that many an investigator has had relatively little training in the use of books outside his specialty and even less in the handling of the scattered and fugitive material which he must take account of. Much can be done by the trained librarian to assist him through the introduction of improved classification and catalogue systems, and by helpful suggestions in looking up literature such as come from an intimate knowledge of the publications themselves. In many cases the librarian could be of much eventual assistance by the giving of instruction on the use of the library to the undergraduate students of to-day who will become the investigators of to-morrow.

The station investigations may be even more facilitated if the librarian can assist in bibliographical work, such as the looking up of references, the making of excerpts, the preparation of indexes, and similar matters. This work calls for a higher grade of service than any of the foregoing, demanding as it does not only training in library methods but considerable scientific knowledge as well. In the past but little such service has been available, but the holding of the Mackinac Island round table is in itself an indication that there is now a considerable number of people well trained for the work. It is reasonable to suppose that with an increased demand an additional supply would be forthcoming.

As the resources of the stations increase a more specialized organization is inevitable. More and more is it becoming manifest that the main asset in their work is the working time of the investigator, and that efficiency is to be sought by conserving his efforts and relieving him so far as possible of duties which can be done as well if not better by others. The maintenance of a well-organized library, with a trained bibliographical aid at its head, should be to him a material assistance and to the station as a whole a positive factor for progress.

The idea of the college as a center of investigation and of advanced thought, as well as of routine teaching, has gained a firm foothold. We have ceased to think of the college or university as being entirely to and within itself. The modern conception is that of an institution which, in addition to giving instruction to its matriculate students, carries on investigation as a basis for the foundation of teaching knowledge, and reaches out to the people through various lines of extension activity.

This conception has found ready acceptance in the case of the agricultural college, whose function is rapidly differentiating under the three heads of instruction, investigation, and extension. While each of these must be organized definitely for its specific effort, there is a possible danger in a too narrow restriction of the field in its effect upon the individual worker. The investigation branch is now repre-

sented by the experiment station, and already the feeling seems to prevail in many colleges that investigation will practically be confined to the station. Leastwise the investigation at the agricultural colleges appears to be limited more and more to those men who are connected with the experiment station.

It is a noticeable fact that comparatively few members of the college faculties who are free from station affiliations are giving much individual attention to research. The encouragement of research as one function of the whole faculty, and the expectation that some attention will be given in that direction, seem to find but little expression at many of our colleges, and the routine of the college year is allowed to absorb the whole time and attention. Apart from the productivity of the college in a broader sense, the effect of this upon the teaching force is especially important. Whether or not some form of research is entered upon, it is quite certain that the teacher should have some definite activity outside the routine of his college duties, in order to maintain his vigor and freshness for his teaching; and because this is voluntary it is no less essential that it should not be overlooked.

The beneficial effect upon the teacher of conducting some form of research is generally conceded. Such effort is encouraged in the larger educational institutions, and in a measure determines a man's standing within the institution and among the coworkers in his specialty. Research or other productive activity is expected of him as a scholar or a man of science.

The effect of such activity in the case of the agricultural instructor would seem to be especially vitalizing and inspiring. The large amount of investigation now being conducted gives him a point of contact, and the wide range and countless number of subjects which the field presents give great choice for selection. Any man who considers intimately the status of the theory of agriculture in relation to the art must be impressed with the abundant opportunity for productive study, and suggestions will thrust themselves upon him. We have only made a bare beginning in getting at the fundamental reason for the theory that is taught. This is based to very large degree on purely empirical data and the results of experience. The thoughtful teacher will have constantly presented to his mind the question as to the real explanation and meaning of the things he teaches.

If we seek the explanation of this paucity of investigation we are confronted first with the unusually heavy teaching duties required in the agricultural colleges, as compared with those in many of the institutions. Probably in no class of institutions of similar grade have the teaching duties been more absorbing, and as the agricultural courses have increased in popularity the size of the teaching force has not always kept pace. There is, however, a greater liberality in the

provision of assistants, and considerable progress has been made in making the teaching schedule conform to a reasonable standard of time, especially in the case of heads of departments. The colleges connected with universities have usually profited by the scale recognized in other departments of the institution, and those which have not might well continue to urge for the agricultural faculty the same standards for class room duties as other departments.

There should be the same opportunity for study and investigation open to the agricultural faculty as to that of other colleges, and nowhere will it prove more helpful. Here as elsewhere the instructor who is ambitious for the success of his work will be active in the efforts for increasing his efficiency. This will often take the form of studies of methods of teaching, the preparation of text-books or manuals, and the devising of materials for illustration, a field presenting great opportunity for advancing agricultural instruction. It is to the men of these institutions that we naturally look for active study of teaching methods and the improvement of agricultural instruction; but apparently these matters have received less systematic attention than they deserve.

Then there is a touch with the progress of science to be maintained through scientific societies, and the teacher can not afford to go empty-handed to these meetings or to seem to have no part in this forward movement. His own name suffers eventually as does that of the institution, for there is an implied lack of life and vigor in a college or a department which has no part in the acquiring of knowledge. It is fair to expect productive ability of some form in the agricultural college instructor as well as in the teaching force of other educational institutions, and the agricultural teacher can hardly be content to let his life work be measured wholly by the record of the class room.

There is no more reason why all investigation and research in agriculture at the agricultural colleges should be confined to the experiment station force than there is why all the teaching should be restricted to the college faculty. The station men are preferably assigned mainly to the station work, but the advantage to them of some opportunity to come into contact with the teaching of the class room and the lecture platform is quite generally recognized and provided. The advantage to the teacher of following out some lines of investigation in his field is perhaps equally recognized theoretically, but it has not been expressed in practice nearly as generally. The obstacles to it are not believed to be insurmountable, as a rule, if the real spirit for it is present.

In some notable cases the earlier teachers in the agricultural colleges were quite active in research and carried on studies which had great influence in paving the way for agricultural experiment stations in this country. This was done under far less stimulating and favorable conditions than prevail at the present time. But since the

instruction work of the college and the experimental work of the station have been more sharply differentiated, there has been a narrowing of the functions of the teacher and the danger that he would allow himself to be segregated from the acquisition of knowledge. The effect of this upon the men themselves is of far more importance than the loss to science; and coupled with this is the influence upon the development of advanced instruction at the agricultural college. The latter is of vital importance in the preparation of suitable workers for the experiment stations and other expert service.

Nothing can be more sterilizing to a teacher than a restriction of his activity to the routine of teaching, a habit which may easily be fallen into and one to be guarded against in the early stages of a teaching career. It is not easy to use profitably odds and ends of time, and this often leads to deferring the beginning of investigation to a more convenient time. But despite the manifold duties which go with a college professorship the vacation periods leave considerable time free for study, in addition to the unoccupied hours during term time; and there are many opportunities afforded by the laboratories, apparatus, greenhouses, farms, libraries, and other facilities usually at hand. The freedom from pressure for results or the more popular forms of experimentation often felt by the station worker is also a favorable condition. There is a great deal of research which at certain stages needs regular attention, rather than large amounts of time, and the more time-consuming operations can often be deferred until there is greater freedom from interruption. One of the prime requisites is a research habit and a definite planning for some work of that nature.

The raising of the standards of the agricultural colleges and the provision of graduate courses will almost necessarily call for greater activity in original study within the college departments proper. The student must be given something of the spirit of investigation and introduced to its methods. He will naturally come to look for this to the men who are themselves active in investigation, and will learn from them to appreciate the bearing and the importance of such work. Such advanced students will also give added opportunity for following some line of investigation.

It would seem that the time has come when the college generally should give more attention to this feature, and take it into account in its relations with the faculty. It is due to the men it enlists in its service, and will contribute breadth and strength to the work of the whole institution. It need involve little money or readjustment; it calls rather for encouragement and recognition as a desirable part of the life of the teacher,—for a favorable atmosphere and an attitude of expectation.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Proceedings of the twenty-sixth annual convention of the Association of Official Agricultural Chemists, held at Denver, Colo., August 26–28, 1909, edited by H. W. WILEY (*U. S. Dept. Agr., Bur. Chem. Bul. 132, pp. 127, figs. 7*).—This is the usual detailed report of the proceedings, extracts from which have been previously noted (E. S. R., 22, p. 614). Papers were also presented as follows:

Determination of ammonia by the official magnesium oxid method, T. C. Trescot (p. 20.)—The author believes that the results obtained by distilling with magnesium oxid should not be reported as free ammonia, but should be expressed as ammonia obtained by distillation with magnesium oxid.

Interpretation of soil analyses with respect to phosphoric acid, G. S. Fraps (pp. 33, 34).—The author states that the phosphates of lime and the normal ferrous or ferric and aluminum salts are easily soluble in fifth-normal nitric acid, while the basic salts of iron and aluminum are only sparingly so. From this, however, it must not be concluded that all soils which contain the same amount of phosphates of lime react in the same manner toward phosphoric fertilizers and particularly to plants.

"Reducing it to its lowest terms, the analysis of a soil with fifth-normal nitric acid amounts to this: Knowing the quantity of phosphoric acid extracted by the solvent, and the absorptive power of the soil for phosphoric acid, estimate how much phosphate of lime is present in the soil. Then, knowing the amount of acid consumed, consider to what extent this phosphate is distributed within the mass of the dissolved material and to what extent it is exposed to the roots of the plants. Having estimated the amount of exposed phosphate of lime, we have next to inquire how much of it is necessary to make a soil fertile. What conditions affect the rate and the quantity of phosphoric acid which these phosphates give up? Then the probable value of the basic ferric and aluminum phosphates present must be considered, and whether or not organic phosphates are in the soil. Having considered all these questions, we will be in a position to interpret the analysis of a soil with fifth-normal nitric acid."

Methods for the determination of the nitrifying and ammonifying powers of soils, F. L. Stevens and W. A. Withers (pp. 34–38).—The nitrifying indexes set up by the authors are as follows: Nitrification inoculating power (N. I. P.) has to do with the factor of the live organisms present and does not take into consideration the fitness or nonfitness of a soil for their activity. It also does not consider species of bacteria but takes them as a whole. Nitrifying capacity (N. C.) regards the fitness of a soil outside of the sphere of micro-organisms, in other words, the capacity to support nitrification if the proper micro-organisms are present. Nitrifying efficiency (N. E.) considers the function of the soil as a whole to produce nitrates as an end product. Ammonification

energies are also classified in a similar manner, A. E. representing the ammonification efficiency, A. I. P. the ammonifying inoculating power, and A. C. the ammonifying capacity.

Methods for determining these indexes are appended. They consist chiefly in judging the action of the micro-organisms of the soil upon ammonium sulphate, and determining the end products, nitrates, nitrites, and ammonia in the media, taking into consideration the nitrates, nitrites, and ammonia originally present in the soil.

A rapid method for the determination of total potassium in soils, O. M. Shedd (pp. 38–42).—Further tests with a method previously noted (E. S. R., 21, p. 209) are presented.

Some investigations concerning the keeping qualities of sugar sirups, fruit sirups, and crushed fruits, H. E. Barnard (pp. 66–71).—This study has particular reference to the keeping quality of soda fountain crushed fruits and fruit sirups. The tests were so carried on as to simulate as nearly as possible the conditions as they exist in soda-water establishments.

"The results briefly summarized indicate, first, that concentrated crushed fruit and fruit sirups may be kept without loss for from 1 to 3 months after opening, when held at a temperature below 50° F.; second, that fountain sirups made with 14-lb. sugar sirup will keep from 2 to 4 weeks without the slightest evidence of fermentation; third, that crushed fruit concentrates diluted with sugar sirup of 14 lbs. to the gallon will keep when exposed at room temperature from 3 to 10 days, and when such goods are placed in the refrigerator of the fountain during the night for a period of 8 hours the time during which they keep in good condition is nearly doubled; fourth, the keeping quality of crushed fruits and fruit sirups is influenced materially by the concentration of the sugar solutions used as diluents."

Distinction of vanilla extract and its imitations, A. L. Winton and C. I. Lott (pp. 109–112).—The authors draw attention to the fact that utilizing subacetate of lead for estimating the lead number with dealcoholized solutions carries down some of the vanillin and thus makes it impossible to determine vanillin, coumarin, and the lead number in one weighed portion. When normal lead acetate is substituted for the basic salt much of this error is eliminated, and when used according to the process given by the authors permits the determination of vanillin in the filtrate.

Determination of starch in cocoa products, W. L. Dubois (pp. 136–138).—The author recommends a rapid shaking out method instead of the tedious and sometimes inaccurate provisional method of the association for estimating the fat in cocoa and chocolate powders.

An accurate method for hydrolyzing starch in unsweetened cocoa and chocolate products, with which it is not necessary to remove the fat before going on with the determination, is also given as follows: "Two gm. of the sample are transferred to a 500 cc. Erlenmeyer flask, 20 cc. of water added, and then 12 cc. of concentrated sulphuric acid, the latter cautiously and with slow rotation of the flask. The mixture is heated over a low flame [for approximately 1½ minutes] with constant rotation until the color changes from brown to reddish black. Thirty cc. of water are then added, the mixture is heated to boiling, and boiled for 15 seconds. A little cold water is poured in, the flask quickly cooled, and the acid nearly neutralized with a saturated solution of caustic potash. The solution is then again cooled and transferred to a 250 cc. flask, completing to volume with cold water. Fifty cc. of the filtrate are used for the determination of copper-reducing substance as dextrose."

Other papers read were Varnishes on Chocolate and Confectionery, by B. H. Smith (pp. 58–60); Suggested Modification of the Winton Lead Number, by S. H. Ross (p. 58), previously noted (E. S. R., 22, p. 709); Phosphorus in Flesh, by P. F. Trowbridge and Louise M. Stanley (pp. 158–160) noted elsewhere (p. 512) from another source; Constants for Creatinin Determinations, by W. B. Smith and I. M. Myers (pp. 160–164); Occurrence of Methyl Pentosan in Cattle Foods, by F. W. Morse (pp. 173–175); Dry Lead Defecation in Raw Sugar Analysis, by W. D. Horne (pp. 184–186); and Comparison of Methods for Sucrose in Sugarhouse Control, by H. P. Agee (pp. 186, 187).

The rate of solution of casein, T. B. Robertson (*Jour. Phys. Chem., 14 (1910), No. 5, pp. 377–392, figs. 2*).—"If casein be stirred at an approximately constant rate in solutions of the hydroxids of the alkalis or of the alkaline earths, the amount dissolved is connected with the time which has elapsed since the casein was introduced into the solvent by the equation $x=Kt^m$, where x is the number of grams of casein dissolved, t is the time, and K and m are constants which depend upon the concentration and kind of hydroxid-solution employed as solvent, and upon the total mass of casein in the mixture.

"The rapidity of solution is, within the limits of the accuracy of the determinations, unaffected by temperature, for temperatures ranging between room temperature and 30°. Equally concentrated solutions of the hydroxids of potassium, sodium, lithium, and ammonium dissolve casein at approximately the same rate. Solutions of the hydroxids of the alkaline earths dissolve casein much more lowly, $Sr(OH)_2$ dissolving it most rapidly, $Ca(OH)_2$ more slowly, and $Ba(OH)_2$ more slowly still. The amount of casein dissolved by a solution of KOH in a given period of time is directly proportional to the concentration of the KOH.

"The rapidity with which casein is dissolved by a given solution of a hydroxid of an alkali increases with the mass of casein present in the mixture. At first the increase in the velocity of solution with increasing mass of casein is rather large, but as the mass of casein is still further increased, the increase in the rapidity of solution is less.

"Having regard to the smallness of the temperature coefficient of this phenomenon, to the dependence of the rate of solution upon the total mass of casein present, and to the identity of the form of the equation $x=Kt^m$ with that which expresses the relation between the amount of a liquid absorbed by a column of sand or a strip of filter paper and the time, it is suggested that the factor which determines the rate of solution of casein in solutions of the hydroxids of the alkalis and of the alkaline earths may possibly be the velocity with which the casein particles are penetrated and wetted by the solvent."

See also previous notes (E. S. R., 19, p. 776; 20, p. 705).

On the refractive indexes of solutions of certain proteins, T. B. Robertson (*Jour. Biol. Chem., 7 (1910), No. 5, pp. 359–364*).—"The refractive indexes of solutions of ovomucoid in distilled water are connected with their concentrations by the formula: $n-n_1=a\times c$, where n is the refractive index of the solution, n_1 is the refractive index of the solvent, in this instance distilled water (1.3333 at 18°), c is the percentage concentration of the protein in the solution, and a is a constant which is numerically equal to the change in the refractive index of the solvent which is brought about by dissolving 1 gm. in 100 cc. The same law has previously been shown to hold good for solutions of casein in various solvents.

"The value of a, in the above formula, for ovomucoid is 0.00160. For ovovitellin the value of a is 0.00130. For casein the value of a has previously been shown to be 0.00152." (See E. S. R., 22, p. 113.)

The distribution of nitrogenous bodies in woman's milk, A. FREHN (*Ztschr. Physiol. Chem., 65 (1910), No. 3, pp. 256–280*).—Comparing the results obtained with those of other investigators, it is concluded that in determining the nitrogen distribution in woman's milk much depends on the method employed. With Engel's method and 27 samples of woman's milk the casein content was between 30 and 53.6 per cent of the total proteids present. For 100 gm. of the milk the limits were between 0.4 and 0.7 per cent of casein. In 10 further samples the casein content fluctuated between 0.72 and 1.26 gm. for 100 cc. of milk, and this represented from 48.7 to 65.9 per cent of the total nitrogen content. The total soluble proteid content was between 38 and 51.3 per cent. Additional estimations made were residual nitrogen, that is, filtrate from casein-free filtrate treated with phospho-molybdic acid.

Variations can also take place in an individual milk where the same method is employed, and which is probably due to the variant physiological condition of the nurse.

The champignon, an indol-producing plant, M. LÖWY (*Chem. Ztg., 34 (1910), No. 39, p. 340*).—This is a continuation of the work previously noted (E. S. R., 22, p. 709), and shows that the coloration produced in an aqueous extract of the champignons with sulphuric acid is due to indican.

Ascertaining the physical and chemical constants of goose fat, J. L. MAYER (*Druggists Circ., 54 (1910), No. 3, p. 106*).—A description of the chemical and physical constants of goose fat, comparisons being made with the figures given in various handbooks on the analyses of fats.

The nature of the acid-soluble phosphorus compounds of some important feeding materials, E. B. HART and W. E. TOTTINGHAM (*Wisconsin Sta. Research Bul. 9, pp. 95–106*).—Previously noted from another source (E. S. R., 21, p. 608).

The spontaneous heating of hay, F. W. J. BOEKHOUT and J. J. O. DE VRIES (*Verslag. Landbouwk. Onderzoek. Rijkslandbouwproefstat. [Netherlands], 1910, No. 7, pp. 26–48, fig. 1*).—A portion of this work has already been noted (E. S. R., 22, p. 70). The authors further find that the acidlike gases which are emitted during the process are due in part to the formation of formic acid. Analyses of such hays show that a diminution in the pentosan and nitrogen-free extractive substances takes place during the process. Iron supposedly acts as a catalyzer.

The analysis of silicate and carbonate rocks, W. F. HILLEBRAND (*U. S. Geol. Survey Bul. 422, pp. 239, figs. 27*).—A revision of Bulletin 305, previously noted (E. S. R., 19, p. 209), the more important changes and additions being as follows:

"The preparation of the sample has been much modified in the endeavor to meet the need for one that shall not have taken up water from the air or have suffered oxidation with respect to ferrous iron or sulphid during grinding. The effect of fine grinding on the composition of the sample has necessitated changes in carrying out certain determinations, notably that for ferrous iron. The chapters on water have been rearranged, and that devoted to general considerations is now introduced by a section on the rôle of hydrogen in minerals. . . . That on sulphur has been supplemented by a section on the errors involved in the determination of sulphur as barium sulphate and their avoidance or correction. Many other minor additions and alterations have been made."

Plasticity and coherence of clays and loams, A. ATTERBERG (*Chem. Ztg., 34 (1910), Nos. 42, pp. 369–371, figs. 3; 43, pp. 379, 380*).—The author has established 6 limits for the plasticity and coherence of clays and loams. In order to

determine the characteristics of a clay it is only necessary to estimate the upper and lower limits of plasticity and the cohesive limit. For loams it is necessary to determine the flowing limit. Attention is directed to the relation of the above factors to the soil and soil analysis.

Examination of peat litter, J. WIDÉN (*Svensk Kem. Tidskr., 22 (1910), Nos. 1, pp. 11–16; 2, pp. 24–34; abs. in Chem. Ztg., 34 (1910), No. 47, Repert., p. 177*).—A discussion of the methods of sampling, the treatment of the samples (drying and reducing), and the determination of the absorption capacity (Fleischer's or old Bremen method, the von Feilitzen method, and the new method employed by the Bremen Moor Station).

A new method for estimating the oxygen content of water, R. MAUCHA (*Kiserlet. Közlem., 13 (1910), No. 2, pp. 244–250, fig. 1*).—The apparatus "Tenax," which is employed by the German Fishery Society, was investigated and found of value only where an approximation of the oxygen content is wanted. The author recommends, however, where such results are desired the employment of von Hofer's modification of Winkler's method, as this is much more simple.

In regard to the water content of rye and wheaten flours, O. RAMMSTEDT (*Chem. Ztg., 34 (1910), No. 39, pp. 337–339*).—A criticism of Arragon's article (E. S. R., 22, p. 708).

Isolation of the creatinin from meat and other extracts, K. MICKO (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 8, pp. 426–434*).—The method consists essentially in precipitating the creatinin with picric acid as creatinin picrate and converting the latter into a chlorid salt, which is sufficiently pure for elementary analysis.

Phosphorus in flesh. Differentiation of organic and inorganic phosphorus, P. F. TROWBRIDGE and LOUISE M. STANLEY (*Jour. Indus. and Engin. Chem., 2 (1910), No. 5, pp. 212–215; abs. in Analyst, 35 (1910), No. 412, p. 311*).—A continuation of previous work (E. S. R., 22, p. 9).

The results indicate that Emmett and Grindley's modification (E. S. R., 17, p. 887) of the Hart-Andrew method for inorganic phosphorus (E. S. R., 15, p. 496) gives low results. This is due to the process employed in separating the coagulable proteins by evaporating the aqueous extracts, this splitting off from 90 to 99 per cent of the organic phosphorus compounds. In its stead the authors recommend Siegfried and Singewald's method (E. S. R., 17, p. 635), which consists "in making the aqueous extract slightly alkaline with ammonia, precipitating the inorganic phosphorus with barium chlorid, filtering, concentrating the filtrate, and in it determining the organic phosphorus by Kjeldahl digestion, precipitation as phosphomolybdate, and weighing as magnesium pyrophosphate.

"The proportion of soluble organic in the total soluble phosphorus in meat varies considerably in different animals and in different parts from the same animal. The lowest recorded (26 per cent) had reference to an emaciated steer, the highest (91 per cent) to a fat show steer. During cooking, a progressive splitting up of the organic phosphorus compounds takes place, and in well-cooked meats practically the whole of the phosphorus is present in inorganic combination."

Contribution to the technique of detecting intracellular ferments, E. ABDERHALDEN and H. PRINGSHEIM (*Ztschr. Physiol. Chem., 65 (1910), No. 2, pp. 180–184*).—Attention is drawn to the fact that some enzym press juices obtained by Buchner's method (E. S. R., 9, p. 923) do not show the presence of all the enzyms which were originally present in the fresh animal or plant tissue. It is therefore necessary to examine both the press juice and the press cake for the presence of enzyms.

Biological differentiation of the proteids in foods and blood stains, O. MEZGER (*Chem. Ztg., 34 (1910), Nos. 40, pp. 346, 347; 41, pp. 363, 364; 42, pp. 371–373*).—This is a detailed description of the technique employed in the detection of the different animal and vegetable proteids in foods and blood stains.

Biological differentiation of milk proteids, J. BAUER (*Berlin. Klin. Wchnschr., 47 (1910), No. 18, pp. 830–832*).—It is possible by means of the complement binding reaction to differentiate casein from the other proteids in milk. It is also possible to recognize the casein from animals of more or less related species.

Detection of calcium sucrate, etc., in milk and cream, S. ROTHENFUSSER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 9, pp. 465–475, figs. 2*).—This is a continuation of the work previously noted (E. S. R., 22, p. 10), and deals chiefly with a modification of the procedure with a view of obtaining greater sensitiveness. The author makes a distinction between free and fixed saccharose. The former has the property of so veiling the watering of milk that it can not be detected by the ordinary analytical methods.

Catalase test for detecting pathological milk, A. GABATHULER (*Milch Ztg., 39 (1910), Nos. 17, pp. 193–196; 18, pp. 205–208*).—From the results of the examination of numerous pathological milks it is found that such milks are very rich in catalase and that this catalase originates chiefly from the leucocytes, which are present in large amounts. It is shown that with an increase in the age of milk an increase in the catalytic activity takes place. Colostral milks are also high in catalase.

Methods used in the examination of milk and dairy products, C. BARTHEL, trans. by W. GOODWIN (*London, 1910, pp. XI+260, figs. 65*).—This is believed to be the first book in English which contains a description of the methods employed in the examination of dairy products in various parts of Europe.

The determination of sucrose in cane molasses, N. DEERR (*Hawaiian Sugar Planters' Sta., Div. Agr. and Chem. Bul. 31, pp. 12*).—The author states, as the principles under which the determination of sucrose in a cane molasses should be made, the following:

"The use of a quantity of basic lead acetate such that the maximum decoloration is obtained, and at the same time much of the levulose (the chief disturbing influence) is eliminated in the precipitate; the elimination, following Tervooren [whose method is to dissolve 35.816 gm. molasses in 250 cc. water with the addition of 40 cc. basic lead acetate, then to add to 100 cc. of the filtrate 1 cc. of 30 per cent acetic acid and 2 cc. of alumina cream, make up to 110 cc., filter and polarize, when the reading multiplied by 2 gives a direct reading], of the specific effect of the basic lead salts on the rotation of levulose by acidification of the solution; the use of dilute solutions (normal to sixth-normal) for the obtaining of the polariscopic reading, so as to eliminate any appreciable error due to the volume of the lead precipitate; the use of long tubes, 60 cm. if possible, so as to eliminate errors due to a small reading; a very slight modification of the Herzfeld procedure of inversion in which 50 cc. of solution are inverted with 2.75 cc. of hydrochloric acid of specific gravity 1.18, or use of the original Clerget procedure, combined with the selection of the appropriate constants; the use of zinc dust as a decolorant of the inverted solution; the obtaining of the direct and inverted readings at the same temperatures and in the same concentration; the selection of the appropriate Clerget constant for the conditions of the analysis.

"Referred to half normal weight the quantities of material required, etc., to fulfill these conditions, would read: Place 9.881 gm. molasses in a 200 cc. flask; add enough basic acetate of lead to obtain the maximum decoloration (generally about 25 cc. of specific gravity 1.26); make up to the mark; and

filter. Transfer 50 cc. of the filtrate to a 50 to 55 cc. flask; add 1 cc. of a saturated solution of aluminum sulphate; make up to 55 cc.; filter and polarize in the 60 cm. tube. The observed reading multiplied by 2 is the direct reading=D. Transfer a second portion of 50 cc. to a 50 to 55 cc. flask; add 2.75 cc. of hydrochloric acid of specific gravity 1.18; invert, following the Herzfeld routine, or add 5 cc. of acid and invert, following the original Clerget procedure; add a small quantity, about 0.1 gm. of zinc dust; make up to the mark; filter and polarize in a 60 cm. tube. The observed reading multiplied by 2 is the inverted reading=I.

"Calculate the percentage of cane sugar from the expression—Sugar percentage $=\frac{D-I}{X-t}$, where t is the temperature at which the analysis is performed, and X is the appropriate constant."

Judging the quality of sugar beets by their content of injurious nitrogen, G. FRIEDL (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 2, pp. 235–239, figs. 2*).—The author finds that by estimating the injurious nitrogen in sugar beets a good index can be obtained as to the purity of the juice after saturation. A definite relation evidently exists between this nitrogen and Krause's coefficient of purity.

A colorimetric method for estimating the injurious nitrogen in sugar beets, G. FRIEDL (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 2, pp. 240–246*).—The author proposes to determine the injurious nitrogen in sugar beets by precipitating the proteids with Barnstein's modification of Stutzer's reagent, and comparing the depth of color of the filtrate with a standard Fehling's solution containing some Schweinfurth green.

Methods and standards in bomb calorimetry, J. A. FRIES (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 124, pp. 32; Pennsylvania Sta. Rpt. 1909, pp. 321–345*).—In the cooperative investigations reported, the undertaking was, independently of all previous determinations of the heat of combustion of any organic substances, to determine anew the heat of combustion of benzoic acid, using the improved form of bomb calorimeter previously noted (E. S. R., 21, p. 200).

The water value of the bomb calorimeter was determined by the computation of component parts, by the electrical method, and by a third method which was tried because the author did not consider the results obtained by the other methods satisfactory.

The principle of the third method consists "in burning equal charges of a substance in the bomb first, under exactly the same conditions as when a heat determination is made and, secondly, after having, without changing any of the external conditions, such as level of water, etc., reduced the water equivalent of the system. The same amount of oxygen is used in each case. From the difference in rise of temperature and the difference in water equivalent it is possible to determine very accurately the water value of the calorimeter.

"By this method it is possible, first, to use a substance of unknown or only approximately known heat of combustion and an oxygen supply of unknown purity to determine the water equivalent of the apparatus and then by means of this new water equivalent and the same determinations to work out accurately the heat of combustion of the substance used, and also to determine the correction for impurities in the oxygen, if any such were present."

The determinations of benzoic acid are reported in full and the use of the bomb calorimeter under different conditions is discussed.

"From his experience with various substances and because of the value obtained for benzoic acid as described in this paper, the author in conclusion desires to urge all persons using the bomb calorimeter for scientific work where results are to be published, for the sake of uniformity and comparability of

results, to adopt benzoic acid as the one single standard against which to standardize the bomb, and to accept 6,322 calories per gram as its heat of combustion. This is the value accredited to Stohhmann, and this value ought to remain the standard until it has been definitely proven to be erroneous and a new value in some way officially recognized and accepted."

Report of the chemical laboratory of the Swedish Moor Culture Association, 1909, H. VON FEILITZEN (*Svenska Mosskulturfor. Tidskr., 24 (1910), No. 2, Sup., pp. 75–94*).—Results of examinations of 1,181 samples of soils, marl and lime, fertilizers, and other agricultural products are summarized in the report.

Vinegar and its making (*Michigan Sta. Circ. 9, pp. 65, 66*).—A short description of the process of manufacture, bacteriology, and legal requirements for vinegar.

The manufacture of vinegar from fermented sugar-beet juice (*Deut. Essigindus., 14 (1910), Nos. 15, pp. 111, 112; 16, pp. 117–119; 17, pp. 124, 125*).—The results of tests to determine the feasibility of producing vinegar electrolytically from sugar beets are here reported.

The electrolytic oxidation of ethyl alcohol to acetic acid, P. ASKENASY, R. LEISER and N. GRÜNSTEIN (*Ztschr. Elektrochem., 15 (1909), No. 21, pp. 846–860, figs. 6; Deut. Essigindus., 14 (1910), Nos. 9, pp. 65–67, figs. 4; 10, pp. 73–75, fig. 1; 11, pp. 81–83; 12, pp. 89, 90; 13, pp. 97–99*).—From the results it is concluded that there exists a probability of producing this acid by electrolysis on a commercial scale.

METEOROLOGY—WATER.

The mechanics of the earth's atmosphere, C. ABBE (*Smithsn. Misc. Collect., 51, No. 1869, pp. IV+617, pl. 1, figs. 122*).—This is the third collection of translations of articles bearing upon this subject and includes the following: Concerning the Cause of the General Trade Winds, by G. Hadley; On the Motion of Projectiles in the Air, Taking into Consideration the Rotation of the Earth, by S. D. Poisson; On the Rotary Action of Storms, by C. Tracy; The Influence of the Diurnal Rotation of the Earth on Constrained Horizontal Motions, Either Uniform or Variable, by N. Braschmann and A. Erman; On the Steady Motions or the Average Condition of the Earth's Atmosphere, and The Limit of the Atmosphere of the Earth, by A. Kerber; On the Paths of Particles Moving Freely on the Rotating Surface of the Earth and Their Significance in Meteorology, by A. Sprung; The Theory of the Formation of Precipitation on Mountain Slopes, by S. Pockels; Researches Relative to the Influence of the Diurnal Rotation of the Earth on Atmospheric Disturbances, by M. Gorodensky; The Relation Between Wind Velocity at One Thousand Meters Altitude and the Surface Pressure Distribution, by E. Gold; Studies on the Movements of the Atmosphere, by C. M. Guldberg and H. Mohn; On the Thermodynamics of the Atmosphere, Theoretical Considerations Relative to the Results of the Scientific Balloon Ascensions of the German Association at Berlin for the Promotion of Aeronautics, On the Reduction of the Humidity Data Obtained in Balloon Ascensions, On the Changes of Temperature in Ascending and Descending Currents of Air, On the Theory of Cyclones, On the Representation of the Distribution of Atmospheric Pressure by Surfaces of Equal Pressure and by Isobars, The Interchange of Heat at the Surface of the Earth and in the Atmosphere, and On Climatological Averages for Complete Small Circles of Latitude, by W. von Bezold; Adiabatic Changes of Condition of Moist Air and Their Determination by Numerical and Graphical Methods, by O Neuhoff; The Relation Between "Potential Temperature" and "Entropy," by L. A. Bauer; The Mechanical Equivalent of Any Given Distribution of Atmospheric Pressure and the Main-

tenance of a Given Difference in Pressure, and On the Energy of Storms, by M. Margules; and The Theory of the Movement of the Air in Stationary Anticyclones with Concentric Circular Isobars, by F. Pockels.

Some relations of meteorology with agriculture, H. Mellish (*Quart. Jour. Roy. Met. Soc.* [*London*], *36* (*1910*), *No. 154, pp. 77–92*).—This article discusses the amount of heat required for the maturing of crops, the relation between wheat yield and the rainfall of the previous autumn, the character of season most favorable to different crops, the topography of fruit lands with special reference to frost, frost protection, physical properties of soils with reference to temperature and absorption of water, phenological observations, relation of forests to rainfall and temperature, and the use of weather forecasts and reports by farmers. The thoroughness and efficiency of the United States weather service are commended.

The classification of climates on a physiogeographical basis, A. Penck (*Sitzber. K. Preuss. Akad. Wiss., 1910, XII, pp. 235–246*).—In this article the author classifies land climates on the basis of the fate of the precipitation on the land as nival, humid, and arid. These 3 principal classes are further divided on the same basis into 8 climatic provinces as follows: Completely and seminival, polar, subnival, completely and semihumid, and completely and semiarid.

Is the air of mountains colder than that of the air at like altitudes? J. Hann (*Met. Ztschr., 27* (*1910*), *Nos. 1, pp. 30, 31; 5, pp. 215–217; abs. in Beibl. Ann. Phys., 34* (*1910*), *No. 12, p. 679*).—Observations bearing upon this subject are briefly summarized.

The action of kainit and carnallite in preventing frost, E. Grohmann (*Fühling's Landw. Ztg., 59* (*1910*), *No. 10, pp. 341–344*).—Observations on pots of sand indicated that applications of from 2.5 to 7.5 centner of carnallite and kainit per hectare (111.53 to 334.59 lbs. per acre) reduced the formation of frost to a considerable extent. When, however, the salts were used at rates of from 10 to 15 centner per hectare (446.12 to 669.18 lbs. per acre) crusts were formed in the surface soil and the formation of frost was not reduced.

The effect of the potash salts in reducing frost is attributed to their indirect action in concentrating the moisture in the upper layers of the soil and thus retarding the penetration of the frost. When, however, the salts are applied in such large amounts that soil crusts are formed, frost penetration is not retarded.

The fight against hail, J. M. Guillon (*Rev. Vit., 33* (*1910*), *Nos. 858, pp. 561–568; 859, pp. 589–596, fig. 1; 860, pp. 617–623, fig. 1; 861, pp. 645–652, figs. 2*).—This article reviews the history of the development of methods of hail protection, as well as the experience of various communities in Europe in employing explosives for the purpose. The author is of the opinion, as a result of his observations, that the results obtained warrant a continuation of further tests of the use of explosives under carefully controlled conditions.

Meteorology, H. D. Edmiston (*Pennsylvania Sta. Rpt. 1909, pp. 201–214, 346–367*).—The observations here recorded are of the same character as those reported in previous years (E. S. R., 21, p. 213). The summary for 1908 is as follows:

Summary of meteorological observations, 1908.

	1908.	Growing season (Apr.-Sept.).
Barometer (inches): Mean	30.029	
Temperature (°F.):		
Mean	49.1	63.1.
Highest	94.0 (July 12)	94.0 (July 12).
Lowest	−9 0 (Feb. 9)	21.0 (Apr. 3).
Greatest daily range	51.0 (Mar. 26)	41.0 (Apr. 9).
Least daily range	1.0 (Apr. 27-30)	
Rainfall (inches)	39.17	21.87.
Number of days on which 0.01 in. or more rain fell	121	61.
Mean percentage of cloudiness	47	4.5.
Number of days on which cloudiness averaged 80 per cent or more.	68.	24.
Last frost in spring		Apr. 21.
First frost in fall		Sept. 16.

Meteorological investigations in Surinam and Curaçao, 1909 (*Meteorologische Waarnemingen, gedaan op de Meteorologische Stations in de Koloniën Suriname en Curaçao in het Jaar 1909. Amsterdam: Govt.* [*1910*], *pp. 16*).—Daily and monthly summaries of observations on pressure, temperature, precipitation, humidity, and wind for the year 1909 are reported.

Rainfall over South Africa, R. T. A. INNES (*Transvaal Dept. Agr., Farmers' Bul. 104; pp. 3, map 1*).—A map showing approximately the distribution of the rainfall is given and briefly described.

The relative value of irrigating waters, H. STABLER (*Engin. News, 64* (*1910*), *No. 2, pp. 57, 58*).—The suitability of waters for irrigation with particular reference to alkali content is discussed and an index of irrigating value based upon alkali coefficient is given.

"The alkali coefficient is a purely arbitrary quantity . . . and may be defined as the depth of water which, on evaporation, would yield sufficient alkali to render a 4-ft. depth of soil injurious to the most sensitive crops." It is based upon the highest concentration of alkali harmless to various forms of vegetation, data for which are given in a table in the article. While the injurious results from the use of a water for irrigation depend largely on drainage conditions and soil texture, a water with an alkali coefficient greater than 18 is considered good, one from 18 to 6 fair, 5.9 to 1.2 poor, and less than 1.2 bad. The waters of various important streams in the United States are classified on the basis of their alkali coefficients as shown in the following table:

Classification of streams of the United States for irrigation purposes.

Stream.	Alkali coefficient.	Class.
Rio Grande at El Paso, Tex	17.0	Fair.
Colorado River at Yuma, Ariz	14.0	Do.
Salt River at Roosevelt, Ariz	12.0	Do.
Gila River at San Carlos, Ariz	9.2	Do.
Salt Fork of Red River near Mangum, Okla	9.1	Do.
Turkey Creek near Olustee, Okla	5.3	Poor.
Pecos River near Carlsbad, N. Mex	4.4	Do.
North Fork of Red River near Headrick, Okla	1.7	Do.
Elm Fork of Red River near Mangum, Okla	.5	Bad.

The interference of wells, F. G. CLAPP (*Engin. News, 62* (*1909*), *No. 19, pp. 483–485, figs. 4; abs. in Wasser u. Abwasser, 2* (*1910*), *No. 13, p. 566*).—This article treats of the conditions under which deep wells affect other wells in the vicinity. Special attention is given to wells in sand and gravel, limestone and

slate, and also to the pollution of water-bearing strata by oil-well waste and sewage.

Improvement of water for dairies, H. K. GÜNTHER (*Molk. Ztg.* [*Hildesheim*], *24* (*1910*), *No. 34, pp. 623, 624*).—This is a discussion of the methods for improving waters for dairy purposes, through removal of iron, softening, etc.

Ultraviolet rays, their bactericidal power and application in the sterilization of liquids, especially water, J. COURMONT (*Rev. Hyg. et Pol. Sanit.*, *32* (*1910*), *No. 6, pp. 578–596*).—This deals briefly in order with the ultraviolet part of the solar spectrum, the sources and bactericidal properties of ultraviolet rays, and sterilization of gases and liquids by ultraviolet rays, and reports a series of investigations on the application of the ultraviolet rays in the sterilization of water and liquids containing colloid substances. The industrial applications of this process of sterilization are pointed out.

The author maintains, on the basis of investigations made in collaboration with T. Nogier, that the method of sterilization by means of the mercury vapor lamp proposed by the latter is absolutely efficient in clear water. It causes no notable chemical changes or heating, is economical, and is practicable for small scale operations. The most effective and economical results are obtained by immersing the lamp in the water.

Does water sterilized by ultraviolet rays contain peroxid of hydrogen? Sterilizing power of peroxid of hydrogen, J. COURMONT, T. NOGIER, and ROCHAIX (*Compt. Rend. Acad. Sci.* [*Paris*], *150* (*1910*), *No. 22, pp. 1453, 1454*).—The authors found no trace of hydrogen peroxid in water sterilized by means of ultraviolet rays. Hydrogen peroxid was found to exert very feeble sterilizing power as compared with the ultraviolet rays.

The chemistry and bacteriology of sewage purification, D. SOMMERVILLE (*Abs. in Contract Jour.*, *1909*, *No. 1589, p. 1050; Surveyor, 36* (*1909*), *No. 930, p. 568; Sanit. Rec., 44* (*1909*), *pp. 452, 486; Wasser u. Abwasser, 2* (*1910*), *No. 10, pp. 435, 436*).—This paper deals with a few fundamental principles of sewage purification.

Sludge disposal, W. C. EASDALE (*Contract Jour., 1909, No. 1595, p. 1400; abs. in Wasser u. Abwasser, 2* (*1910*), *No. 13, pp. 561, 562*).—The methods of disposal discussed in this article include conversion into marketable manure, disposal at sea, sludge pressing, shallow burial in the ground, lagooning or air drying, application of wet sludge to the land, burning, and mixing with house refuse for manurial purposes. The conversion into manure is considered an expensive process, the demand for such material not being sufficient to consume the output. Spreading the wet sludge on the land is likely to create a nuisance. Mixtures of sludge and house refuse dry fairly rapidly and produce a good manure which is easily handled and suitable for sale.

SOILS—FERTILIZERS.

An investigation of the causes of variation in soil fertility as affected by long continued use of different fertilizers, B. E. BROWN and W. H. MACINTIRE (*Pennsylvania Sta. Rpt. 1909, pp. 27–83, pls. 9*).—This article reports a continuation of investigations begun in 1907 (E. S. R., 21, p. 217), on the soils from plats which have been used for 28 years in a 4-year rotation experiment with corn, oats, wheat, and hay. The crops grown in 1908 were mixed clover and timothy. The experimental studies were the same as in 1907.

As in the previous year, there was considerable variation in water-soluble nitrogen, the high yielding plats showing the greatest amount of this constituent. The water-soluble potash varied very slightly, but it was observed that the largest amounts of this constituent were obtained during the

period of greatest growth. The water-soluble calcium showed variations similar to those observed in potash. Humus was highest in the most productive plats. Those plats which showed the lowest percentage of moisture contained the largest amount of nitrogen associated with humus. The total nitrogen varied with the productive capacity of the plats. The conditions for nitrate production were most favorable under corn. In comparative tests of extract soils growing corn, oats, wheat, clover, and timothy, it was found that untreated extracts from corn soil gave the best results. The results with the extracts were in general in accord with the productive power of the plats as determined in the field tests. "The plats in other crops did not furnish extracts as favorable to the development of the wheat plant indicator as the tier in corn, nor were the results in accord with field practice. After treating these extracts with purifying substances like carbon black, the actual development was improved and the average results of many experiments then indicate a correlation with field results.

"It would seem, then, that the growing crop exerts an influence upon the soil solution in situ; an influence transmitted to the extracts prepared in the laboratory from fresh soil samples, but removable to a certain extent by treatments with absorbents, such as carbon black or ferric hydrate."

Contribution to the study of the relations between the fertility of the soil and the phosphoric acid soluble in water, I. POUGET and D. CHOUCHAK (*Rev. Gén. Chim., 13 (1910), Nos. 10, pp. 157–178, figs. 9; 11, pp. 198–201; abs. in Chem. Ztg., 34 (1910), No. 78, Repert., p. 313*).—The relation of water-soluble phosphoric acid, determined by the authors' colorimetic method (E. S. R., 21, p. 105), to productiveness as determined in pot experiments with wheat was studied with 17 soils.

It was found, as Schloesing has shown, that the rate of solution of the phosphoric acid of the soil in water decreases more or less rapidly with successive extraction until it becomes practically constant. The authors therefore conclude that the phosphoric acid is present in two different forms, the first probably phospho-humates, very soluble in water, the second, probably the mineral phosphates, much less soluble. The first has a marked effect in the early stages of growth, but in poor soils the rate of solubility of the second determines the final yield, since, according to the authors, the yield is dependent upon the concentration of phosphoric acid in the soil solution. This they maintain is by no means constant for all soils.

The absorption of phosphoric acid in soils by plants, I. POUGET and D. CHOUCHAK (*Rev. Gén. Chim., 13 (1910), No. 12, pp. 219–222; abs. in Chem. Ztg., 34 (1910), No. 78, Repert., p. 313*).—This is an account of the investigations noted above.

The conservation of the fertility of the soil, A. D. HALL (*Jour. Bd. Agr. [London], 17 (1910), No. 2, pp. 114–123*).—This paper deals especially with changes in the nitrogen content of soils, "because though phosphoric acid, potash, and lime are important factors in plant nutrition, these elements are not susceptible to the gains and losses from external operations like cultivation, by which the stock of nitrogen is so greatly affected." The factors which give rise to gain or loss of nitrogen in the soil are discussed on the basis of observations on various plats at the Rothamsted Station.

The general conclusion reached is "that with every system of farming a certain position of equilibrium will be reached (viewed over a term of years long enough to smooth out seasonal effects) when the natural recuperative agencies and the additions of fertilizing material in the manure are balanced by the removals in crops and stock and the inevitable waste. The higher the level of production, the greater will be the waste, and, in consequence, the additions of

fertilizer must be doubly increased to maintain the balance. How high a level of production can be profitably maintained is determined by the prices that rule for the crops, but there will always come a limit when the production can be no longer increased by additions of fertilizer except at a loss; at such a stage it is only the introduction of improved varieties or some variation in the methods of cultivation inducing a better utilization of the fertilizer which will still profitably increase the production per acre."

The conservation and utilization of our natural resources, J. H. PRATT (*Jour. Elisha Mitchell Sci. Soc., 26 (1910), No. 1, pp. 1–25, pls. 12*).—This article describes the physiographic divisions of North Carolina and deals particularly with the conservation and utilization of soils, forests, waterpowers, mineral products, swamp lands, and fish industries. Methods of protecting soils from erosion are described.

A preliminary study of chemical denudation, F. W. CLARKE (*Smithsn. Misc. Collect., 56, No. 1935, pp. 19*).—This article deals with the measurement of soil denudation by means of the dissolved solids carried into the sea by rivers. Denudation varies widely in different regions and watersheds, but an attempt is made to estimate the mean denudation for different continents. The crude estimates are as follows:

Denudation values for each continent.

Continent.	Area.	Denudation per square mile.	Total denudation.
	Square miles.	*Tons.*	*Tons.*
North America	6,000,000	79	474,000,000
South America	4,000,000	50	200,000,000
Europe	3,000,000	100	300,000,000
Asia	7,000,000	84	588,000,000
Africa	8,000,000	44	352,000,000
Totals and means	28,000,000	68.4	1,914,000,000

From the figures reviewed it is estimated that 175,040,000 metric tons of sodium are annually discharged into the sea. From this figure and the sodium content of the ocean it is calculated that the probable age of the ocean is 80,726,000 years.

[Second annual report of Florida State Geological Survey, 1909] (*Fla. Geol. Survey Ann. Rpt., 2 (1909), pp. 299, pls. 19, figs. 5, map 1*).—This contains an Administrative Report, by E. H. Sellards; A Preliminary Report on the Geology of Florida, by G. C. Matson and F. G. Clapp; Topography and Geology of Southern Florida, by S. Sanford; Mineral Industries, by E. H. Sellards; and The Fullers Earth Deposits of Gadsden County, with Notes on Similar Deposits found Elsewhere in the State, by E. H. Sellards and H. Gunter. The work reported was done in cooperation with the U. S. Geological Survey and had special reference to the stratigraphy of the region. Among the subjects of special agricultural interest which are dealt with are topography and drainage, soils, and phosphate deposits.

Bibliography of North Carolina geology, mineralogy and geography, with a list of maps, F. B. LANEY and KATHARINE H. WOOD (*N. C. Geol. and Econ. Survey Bul. 18, pp. 428*).—It is stated that this "bibliography relating to North Carolina geology, mineralogy, geography, and allied subjects, as paleontology, meteorology, petrology, etc., has been made just as complete as possible, although there are undoubtedly certain references left out that should be included. Over 200 periodicals have been examined, and in most cases complete files of

these have been available. . . . The bulletin is divided into two parts, part one containing the bibliography, and part two containing a list of maps relating to North Carolina."

A detailed and carefully prepared index makes it easy to find what has been published on the various subjects covered by the bibliography. A considerable number of references will be found in this index on such subjects of special agricultural interest as drainage, meteorology, and climatology, soils, limestone, marl, and phosphates.

Soils of New South Wales, I, H. I. JENSEN (*Agr. Gaz. N. S. Wales, 21 (1910), No. 2, pp. 95–114, map 1*).—This article deals with the soils of the South Coast and discusses the judging of the agricultural value of land by natural forest growth, underlying rock formation, and chemical analysis combined with field observations. The last method is considered most reliable. The author considers the thickness and size of forests no guide to the agricultural value of land, but thinks forest growth has a decided influence on rainfall and floods.

The chemical composition and general character of type soils of the region are given. These include alluvial, sandstone, granite, diorite, basalt, phyllite, schist, and slate soils. The alluvial soils are well supplied with plant food, the sandstone soils are very poor, the soils from acid granites are poor, and those from basic granites good, the diorite and basalt soils are good, and the soils derived from the metamorphic rocks, phyllite, schist, and slate are usually poor.

The alluvial soils of Guà, G. E. MARCHETTI (*Gior. Geol. Prat., 8 (1910), No. 3, pp. 105–118*).—The results of physical and chemical analyses of 12 samples of soils from this region are reported and the data are discussed with reference to the origin of the soil.

The sand dunes of the Libyan Desert, H. J. L. BEADNELL (*Geogr. Jour., 35 (1910), No. 4, pp. 379–395, pls. 4, figs. 3*).—This article gives "a preliminary account of the geographical and economical aspects of the great sand accumulations of the Libyan Desert, especially in relation to the geological and meteorological conditions which exist in this region." It discusses the character, extent, and methods of formation and movement of these dunes.

The meaning and value of the chemical analysis of soils, R. D. WATT (*Transvaal Dept. Agr., Farmers' Bul. 16, pp. 7*).—This bulletin gives the average composition of 100 typical Transvaal soils and explains the significance of results obtained by chemical analysis.

Composition of grass land, including a study of soil variations, W. FREAR and J. W. WHITE (*Pennsylvania Sta. Rpt. 1909, pp. 215–243*).—This is an account of chemical studies of soil from plats which have been used for a number of years in a series of fertilizer experiments. For comparative purposes, studies were begun with samples of soil from roadways adjoining the plats. Full discussion of the results is reserved until further investigations have been made, but the general conclusion is drawn "that close computations of the income and outgo of plant food, as determined by soil analysis, as well as by that of fertilizer, rainfall, crop, and drainage waters, requires much more detailed studies of local variations in soil composition than investigators have heretofore been making.

"From this series of comparisons upon the soils of the parallel grass roads, no general relation appears between the position of the respective roadways upon the hillside and their chemical composition."

The phenomena of flocculation and deflocculation, E. E. FREE (*Jour. Franklin Inst., 169 (1910), No. 6, pp. 421–438, figs. 5; 170 (1910), No. 1, pp. 46–57, figs. 2*).—This article summarizes present knowledge of flocculation phenomena

as they affect suspension and as they are affected by various external conditions, such as the presence or absence of soluble salts, acids, alkalis, and organic colloids. The knowledge of this phase of the subject is summarized as follows:

"The phenomena of flocculation occur in 'disperse' systems consisting of fine particles distributed through a medium, and classifiable according to size of particle and to the physical state of the particle and the medium.

"They are characteristic of these states of matter and not of any particular substance or substances.

"Flocculation and deflocculation are but relative terms. The more exact concept is that of degree of flocculation.

"This degree of flocculation is influenced by many factors, of which the main are added substances of the following three classes: (1) Most acids and neutral salts which increase the degree of flocculation; (2) the stronger alkalis, which decrease the degree of flocculation; (3) most organic (liquid-particle) colloids, which prevent increase in the degree of flocculation.

"The action of salts, acids, and alkalis is probably at least two-fold: (1) On the mutual interpenetration (solubility) of particle and medium; (2) on the electric charges on the surface of the particle.

"The stabilizing action of organic colloids is due to the formation of thin films of the colloid substance about the suspended particles."

Various applications of flocculation phenomena are noted and flocculation of soils is treated in an appendix based largely upon Bulletin 50 of the Bureau of Soils (E. S. R., 19, p. 818). In this it is shown that flocculation phenomena in soils are very different from those occurring in suspension, the controlling factor in the former being the surface tensions at the gas-liquid surfaces of the soil particles.

A report on soil temperature in connection with plats differently treated, B. E. Brown (*Pennsylvania Sta. Rpt. 1909, pp. 92–103*).—This is an account of the continuation of experiments described in an earlier report (E. S. R., 21, p. 219). In addition to the detailed temperature records data are given for moisture, nitric nitrogen, and water-soluble potassium and calcium.

The influence of moisture upon yields of hay in 1908 and 1909, B. E. Brown and W. H. MacIntire (*Pennsylvania Sta. Rpt. 1909, pp. 104–106, pls. 2*).—Observations of soil moisture and yields are reported in tables and diagrams. The results indicate that the moisture conditions in 1908 affected the yields in 1909.

The effects of adding salts to the soil on the amount of nonavailable water, W. T. Bovie (*Bul. Torrey Bot. Club, 37 (1910), No. 6, pp. 273–292, figs. 4*).—This paper reports investigations to determine the effect upon the amount of nonavailable water of adding varying amounts of sodium chlorid or the salts of the full nutrient solution to the soil.

It was found "that the amount of nonavailable water is not influenced by adding to pure quartz [0.1 to 0.8 per cent] of either sodium chlorid or the salts of a full nutrient solution.

"Practically all plants of economic value are land plants, and hence, for both their water and food supply, are dependent on water films. Therefore, it is important that we understand the conditions of equilibrium between the plant and this form of water.

"It is apparent that the isotonic values determined for substances dissolved in free water do not necessarily hold for film water. We can not thoroughly understand the acquisition of water and food by land plants, or the results from fertilizer experiments until some of these values are known. Further, the conditions of equilibrium in film water must be determined for both toxic and

'balanced' solutions, before we have reached a logical stopping place for these lines of research."

The need of further carefully controlled experiments on this subject is pointed out and some of the conditions under which such experiments should be made are explained. A bibliography of 19 references to the literature of the subject is given.

The carbon dioxid content of soils during different stages of growth of plants, P. Babakov (*Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *11* (*1910*), *No. 3, pp. 321–343, figs. 4*).—Examinations of the air of different soils in lysimeters planted to various crops showed that the carbon dioxid content of the air was insignificant at the beginning of vegetation, increasing rapidly and reaching its maximum at the blooming period, then declining rapidly and reaching its minimum at the period of ripening. The more fertile the soil and the greater the plant growth the larger was the carbon dioxid content. The carbon dioxid was derived mainly from the respiration of the plant roots, and this varied with different plants at different stages of growth. With lupines the maximum was reached at the blooming stage, with oats about two weeks before blooming. With barley respiration was less active than with oats, and it was still less active with winter cereals, especially wheat. Root and tuber plants slowly reached their maximum and slowly declined. With potatoes the maximum of carbon dioxid excretion was reached after blooming, with sugar beets at the period of maximum growth.

Variation in the carbon dioxid of the soil was affected to some extent by the sinking of the moisture of the air into the soil and by the decomposition of the organic matter supplied by green manuring with lupines and vetches, but the latter is ordinarily much less important than the carbon dioxid excreted by plant roots.

Nitrates in the soil, W. P. Headden (*Colorado Sta. Bul. 160, pp. 8*).—This is a brief account of investigations which were more fully reported in an earlier bulletin of the station (E. S. R., 23, p. 221).

The "acid soil" bugaboo, J. A. Bonsteel (*Gard. Mag.* [*N. Y.*], *12* (*1910*), *No. 1, p. 23*).—This article maintains that the litmus paper test for acidity of soils is not reliable except in the hands of an expert, and may indicate a harmful degree of soil acidity in many cases where such condition does not actually exist.

A new viewpoint concerning the fertility of the soil, B. Sjollema (*Cultura*, *22* (*1910*), *No. 259, pp. 108–121*).—This is a discussion of the recent additions to the theory of soil fertility, and is based more especially on the work of Russell and Hutchinson (E. S. R., 22, p. 121).

The fertilizing influence of sunlight, F. Fletcher and E. J. Russell (*Nature* [*London*], *83* (*1910*), *No. 2121, pp. 488, 489*).—Further discussion of this subject (E. S. R., 23, p. 123), is given, bearing especially upon the effect of toluene in rendering toxic substances in soils insoluble and the relation of fertility and bacterial activity.

The American fertilizer handbook, 1910 (*Philadelphia, 1910, pp. 246, figs. 33*).—This contains in addition to the usual directories of fertilizer manufacturers, cotton-seed oil mills, and allied fertilizer trades, special articles on the National Fertilizer Association, a statistical abstract of the fertilizer industry of the United States, the Peruvian guano deposits, the New York fertilizer materials market, and the Chicago ammoniate market, sulphuric acid tables, notes on cyanamid as a fertilizer ammoniate, the manufacture of sulphate of ammonia, official methods for the analysis of fertilizers and soils, and the potash industry.

Average composition of the more important farm and commercial fertilizers, M. HOFFMANN (*Arb. Deut. Landw. Gesell., 1910, No. 160, 2. ed., colored chart*).—This is a second edition of a colored chart 90 by 115 cm. (35 by 45 in.) showing graphically the nitrogen, phosphoric acid, potash, and lime content of the more important farm and green manures and commercial fertilizing materials, as well as the amounts of these constituents removed from the soil in various crops.

Commercial fertilizers and their use in North Carolina, C. B. WILLIAMS (*N. C. Student Farmer, 1 (1909), Nos. 9, pp. 166–169; 10, pp. 186–189; 2 (1909), Nos. 1, pp. 4–7; 2, pp. 24–27*).—This is a general discussion of the nature and use of fertilizers, particularly as applied to North Carolina conditions.

Home mixed fertilizers (*Maine Sta. Doc. 377, pp. 20*).—This article clearly and concisely states the practical advantages of home mixing, describes methods of mixing, and gives formulas for various crops.

Penetration of fertilizers in the soil (*Engrais, 25 (1910), No. 26, pp. 720, 721*).—This is a review of an article by A. Demolon which lays particular stress upon the importance of applying even soluble fertilizers in a finely divided condition and using methods of culture which will keep the soil supplied with sufficient moisture to diffuse the fertilizers in the soil. See also a previous note (E. S. R., 21, p. 720).

Concerning some effects of long-continued use of sodium nitrate and ammonium sulphate on the soil, B. E. BROWN (*Pennsylvania Sta. Rpt. 1909, pp. 84–92*).—From a study of samples of soil from plats which have been used for 28 years in experiments with a 4-year rotation of corn, oats, wheat, and hay, the following conclusions are drawn:

"Plats receiving sulphate of ammonia required more lime than plats receiving nitrate of soda.

"The plat receiving the larger application of sulphate of ammonia showed a higher lime requirement than the other plats.

"The plat receiving the larger application of nitrate of soda required the least amount of lime.

"In three cases the lime requirement decreased with depth of sampling. The depth of sampling was: 0–3 in., 3–6 in., and 6–12 in.

"The depressing effect of the larger application of sulphate of ammonia on the yields of crops, especially corn and hay, is quite marked at the present time. While this treatment no doubt has brought about soil conditions as a result of which sorrel has infested the plat, it is probably true also that this plant, when turned under, tends directly to make for more untoward soil conditions. On certain portions of the plat receiving 72 lbs. nitrogen in sulphate of ammonia, the sorrel flourishes to better advantage. It is here that corn does so poorly. In these spots a brown crust forms on the surface, which is markedly acid and very bitter to the taste. A qualitative examination of the crust contained a large amount of water-soluble sulphate; at least a large amount of barium sulphate was thrown down upon addition of barium chlorid. The aqueous solution turned blue litmus paper red. On other parts of the same plat this crust does not occur as far as our observation has shown, and the corn plants were much better. As a matter of fact where the most sorrel prevailed and where the crust also occurred, the plants died. The 'poor' spot required twice as much calcium oxid as the good portion of the plat."

All of the plats receiving ammonium sulphate except one contained more matter insoluble in hydrochloric acid of 1.115 specific gravity than those not so treated. There were more marked variations in the content of lime than of

the other constituents. There were very slight variations in total nitrogen and humus.

The production of sulphate of ammonia in the year 1909, C. G. ATWATER (*Amer. Fert., 33 (1910), No. 1, pp. 16–20*).—The world's production of sulphate of ammonia in 1909 is given as 963,490 metric tons. Of this amount England produced 353,590 tons, Germany 322,700 tons, and the United States 96,600 tons. The total consumption in the United States is given as 149,192 short tons at an average price of $56.04. The imports amounted to 40,192 short tons.

Report on the effects of the new nitrogenous manures on potatoes and hay, R. B. GREIG (*Aberdeen and No. of Scot. Col. Agr. Leaflet 9, pp. 7*).—In field experiments with calcium cyanamid and calcium nitrate as compared with ammonium sulphate and sodium nitrate both the calcium nitrate and the cyanamid were effective sources of nitrogen for potatoes, the nitrate being slightly better than the cyanamid. The calcium nitrate was not quite as effecive as sodium nitrate and ammonium sulphate on hay. Calcium cyanamid appeared to be entirely unsuited for top-dressing hay.

Present state and tendency of the electrochemical industry with respect to calcium nitrate (*Bul. Mens. Off. Renseig. Agr. [Paris], 9 (1910), No. 5, pp. 505–521*).—This is a report to the ministry of agriculture of France on the various processes which have been proposed for the manufacture of calcium nitrate and the extent to which these processes have been used in practice. Estimates of cost of production by different processes and in different factories are also given.

Air nitrate fertilizers, F. H. MASON (*Daily Cons. and Trade Rpts. [U. S.], n. ser., 1 (1910), No. 4, pp. 56–58*).—A brief account is given of the development of the process of manufacture of nitrates by the electrical oxidation of the air.

Fixation of the nitrogen of the air by the Schönherr process, P. PIERRON (*Rev. Électrochim. et Électrométal., 4 (1910), No. 5, pp. 90–94*).—This article discusses the principles upon which this method rests and describes the method and its practical application.

On the formation of calcium cyanamid, F. FOERSTER and H. JACOBY (*Rev. Électrochim. et Électrométal., 4 (1910), No. 5, pp. 95–100*).—This article reports the results of further investigations (E. S. R., 22, p. 225) on the following points involved in the manufacture of cyanamid: The action of calcium fluorid, self heating of the mass in the formation of cyanamid, and the cyanid content of cyanamid.

A new nitrogenous fertilizer, aluminum nitrogen (*Ztschr. Landw. Kammer Braunschweig, 79 (1910), No. 12, p. 137*).—This article describes briefly Serpek's process of utilizing aluminum carbid in the manufacture of aluminum nitrogen. The process is said to be simple and cheap as regards raw materials and the product may be used directly as a fertilizer.

Phonolite meal, a new potash fertilizer, P. KRISCHE (*Chem. Ztg., 34 (1910), No. 44, p. 387*).—Experiments by various investigators are briefly reviewed. The general conclusion is that phonolite meal is not comparable with potash salts as a potash fertilizer.

[Utilization of milk waste as a fertilizer], H. B. MILLER (*Daily Cons. and Trade Rpts. [U. S.], n. ser., 1 (1910), No. 12, p. 156*).—A process of preparing a fertilizer by mixing milk waste with phosphate and fermenting with yeast is described. The product prepared by this process is reported to contain water 27 per cent, total phosphates 52.78 per cent, phosphates soluble in 2 per cent citric acid 28.35 per cent, nitrogen 1.05 per cent.

Analyses of domestic manures, M. S. McDOWELL (*Pennsylvania Sta. Rpt. 1909, pp. 198–201*).—Analyses of samples of pigeon manure, sheep manure, and

spent mushroom manure are reported and briefly discussed. The air-dried pigeon manure weighed 40 lbs. per bushel and contained nitrogen 6.17 per cent, potash 1.51 per cent, and phosphoric acid 1.7 per cent.

Analyses of commercial fertilizers, M. A. Scovell and H. E. Curtis (*Kentucky Sta. Bul. 146, pp. 301-409*).—This bulletin reports the results of inspection of 515 brands of commercial fertilizers registered for sale in Kentucky during 1909.

[Inspection of commercial fertilizers] (*Missouri Sta. Bul. 85, Sup., folio*).—Determinations of potash in 30 samples of fertilizers omitted from the original report (E. S. R., 23, p. 26) are here supplied.

AGRICULTURAL BOTANY.

An experimental study of the rest period in plants, W. L. Howard (*Missouri Sta. Research Bul. 1, pp. 5-105*).—In studying the hardiness of the peach, it was found that this characteristic was intimately associated with the rest period. In order, therefore, to arrive at a better understanding of this aspect of hardiness, a study of the nature and principles of the rest period of plants in general was undertaken.

In this paper an initial report is made on the treatment for forcing into growth of about 500 species and varieties of dormant (winter-rest) woody plants, including maples, chestnuts, alders, beeches, hickories, hackberries, dogwoods, hawthorns, elms, oaks, lindens, and fruit trees. It was found that external conditions determine both the time of occurrence and the degree of intensity of the rest period. If unfavorable conditions, such as cold or drought, occur at regular intervals, the plant readily adapts itself to these new demands, and resting becomes a habit which may continue to be repeated automatically for a longer or shorter period, and may become strongly fixed and apparently transmissible.

The results are given of a large number of experiments on shortening the dormant period, in which the following methods were tested: (1) Effects of warmth alone: (2) treatment with ether only; (3) freezing, etherizing, and the use of dark chamber; (4) etherizing, drying, freezing, and dark chamber, singly or in combination; and (5) miscellaneous and special tests, such as the use of chloroform, desiccating with alcohol, with salt solutions, and with sulphuric acid, etc. A careful study of the results of these experiments seems to indicate that while these various agencies may quicken the growth, they probably exert no specific action.

A bibliography is appended.

Influence of ultraviolet light on the germination of seed, L. Raybaud (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 15, pp. 772-774*).—Previous investigators (E. S. R., 22, p. 436) have shown that ultraviolet light exerts an injurious influence on green plants, and the author reports a study of the effect of this light on the germination of plants, particularly of cress.

The ultraviolet radiations, which were found to destroy the growing plants, favored germination, the young plants not being injured for some little time, possibly because of the absorptive power of their thin tissues. The death of the plant followed shortly after the formation of chlorophyll, and this was most active as the ultraviolet rays approached the violet portion of the spectrum. The central axis of the plants exposed to the light of a mercury vapor lamp showed an abnormal position, which it is believed was due to the formation of long rectangular cells in the injured part of the plants.

Osmotic pressures in plants; and a thermo-electric method of determining freezing points, H. H. Dixon and W. R. G. Atkins (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1910), No. 25, pp. 275-311, fig. 1, dgm. 1*).—A study was made of the

leaves, roots, and fruits of about 2 dozen species of plants to determine the osmotic pressures from the freezing points of the saps. Most of the experiments were carried on with the common lilac (*Syringa vulgaris*).

It was found that osmotic pressures vary with species and individuals, but that leaves of the same individual under similar conditions have the same osmotic pressure. Under varying conditions, as in the case of the lilac, the pressure in the leaves was found to vary from 24.58 to 11.58 atmospheres. The variation in pressure was not limited by the height of the leaves above the ground, nor by the resistance of the conducting tracts supplying the leaves. In each case the osmotic pressure was much greater than the tension of the water supply could have been.

The variations in the osmotic pressure observed are believed to have been due principally to fluctuations in the carbohydrate contents of the cells. A similar, but smaller, rise in pressure was observed in plucked leaves stored in the dark, the changes in this case being probably due to the hydrolysis of saccharose and starch. In starved leaves or in roots kept in the dark no such rise was observed. Shielding the leaves from light was found to reduce greatly the osmotic pressure in leaves still attached to the plant, and mature leaves, other things being equal, showed a higher osmotic pressure than developing ones.

In all the roots examined the osmotic pressure was comparatively low, only from 4 to 6 atmospheres.

The greatest depression of freezing point recorded was with the sap of the lilac, which corresponded to an osmotic pressure of 26.87 atmospheres. The smallest depression was in the sap of *Chamærops humilis*, which amounted to only 3.79 atmospheres.

The high figures given for the lilac are not believed to be the maximum osmotic pressure for this plant. It was found that assimilation and evaporation could raise the osmotic pressure of leaves before wilting. In summer, when the leaf cells are loaded with greater quantities of sugars, the wilting concentration will be higher, and in this case it seems probable that pressures of from 30 to 40 atmospheres may be found in the lilac.

The formation of albuminoid substances in plants, N. I. VASILEV (*Trudui Mendelyevsk. Syezda Obshch. i Prikl. Khim., 1 (1907), pp. 402–404; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 5, pp. 703, 704*).—Among the more important facts established by the author were the following:

An increase in albuminoid nitrogen takes place at the expense of asparagin in pods of lupines when separated from the plant, whether they are kept in darkness or in the light. There was an evident transfer of albuminoid substances from the pods to the seed, and it seems probable that some of the amido acids are converted into asparagin, which in turn is used in the formation of albuminoid materials. In general the other organic bases were found to have a rôle similar to that of the amido acids. The seeds showed such an increase in the total albuminoid material that in addition to the proportion obtained from the pods there must have been a utilization of the crystalline nitrogenous compounds in the seeds. A constant decrease in asparagin and amido acids was found to take place with the increase in albuminoids.

The effect of certain hydrolyzable salts on plants, A. GRÉGOIRE (*Bul. Soc. Chim. Belg., 24 (1910), No. 4, pp. 200–209, pl. 1*).—In order to determine the effect of readily hydrolyzable salts on plant growth the author conducted a series of water cultures with rye, testing the comparative effect of a humate of silica and calcium, precipitated calcium carbonate, sodium zeolite, and calcium zeolite. These salts were chosen as they commonly occur in soils.

As a result of the application of these salts, growth was retarded by the humate compound and by the calcium carbonate, while the other two minerals stimulated both root and aerial development. They also caused a marked increase in the ash content of the plants, the increase being largely composed of silica.

The experiment is believed to show that hydrolyzable salts have a special influence on plants aside from their value as mineral nutrients. The action of the different salts will be favorable or retarding according to the compounds used.

The rôle of oxygen in the formation and destruction of red pigments in plants, R. COMBES (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 19, pp. 1186–1189*).—A study was made of a number of species of plants the green leaves of which become reddened late in the season and of those the leaves of which are red in the early stages, afterwards losing this color, and normally becoming green.

There was found to be a loss of oxygen in connection with the disappearance of anthocyanin. As a result of the studies it is claimed that when anthocyanic pigments are formed oxygen is retained by the organs during the process of their reddening, and that at this time there is an increased activity of oxidation in these organs. When the pigments are disappearing the organs containing them suffer a loss of oxygen.

Physiological studies of Cuscuta, O. GERTZ (*Bot. Notiser, 1910, Nos. 2, pp. 65–80; 3, pp. 97–136*).—The main purpose of the investigation was to study the conditions of the formation of haustoria. The effect of radium emanations on the twining motion and on the formation of haustoria was also studied, the results showing that both these processes were completely checked by the emanations.

A full bibliography of the subject is given in the paper.

The growth of certain molds in oil, H. COUPIN (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 19, pp. 1192, 1193*).—A report is given of studies of about a dozen species of molds, in which the fungi were transferred from pure cultures to cubes of carrot and after growth had started submerged in olive oil. In practically every instance there was some growth on the carrot immersed in the oil, the mycelium in many cases, however, remaining short and differing quite materially from the normal appearance. In most instances the fungi remained sterile; in only a few cases were fruiting bodies formed. In general the growth resembled these molds in water rather than in the air.

Endotrophic mycorrhiza in certain fruit trees, V. BOULET (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 19, pp. 1190–1192*).—The author reports the occurrence of endotrophic mycorrhiza on the roots of almond, apricot, peach, cherry, plum, prune, quince, pear, apple, etc., in various regions of France. The mycorrhiza appears to live as a parasite and the parasitism generally has a beneficial effect on the host, except when the essential organs of the root are attacked. Under normal conditions they are protected by their vigorous growth.

Hyphal fungi occurring in the root tubercles of Elæagnus angustifolia and Alnus glutinosa, F. ZACH (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 117 (1908), I, No. 8, pp. 973–984, pl. 1*).—This is a further study (E. S. R., 16, p. 1005) and discussion of the symbiotic relationship and the taxonomic position of the hyphal fungi found in the root tubercles of *A. glutinosa* and *E. angustifolia*.

Structure of tomato skins, B. H. A. GROTH (*New Jersey Stas. Bul. 228, pp. 3–20, pls. 8*).—This bulletin deals with the cell structure of the fruit skins of nine types of tomatoes, and is a part of work now in progress on the histology of stems, leaves, and roots of the same types. The object of the series is to

determine to what extent microscopic differences in structure are correlated with varietal characters, and to furnish a more exact basis upon which the laws of heredity of such characters may be studied.

[Some miscellaneous economic plants of Palestine], A. AARONSOHN (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 180, pp. 7–13, 34–36, figs. 5*).—Attention is called to the similarity in general conformation, climate, rainfall, and vegetation of Palestine to that of California, and because of this fact it is claimed that many of the economic plants of that region should thrive in California, Arizona, and other similar sections of the United States.

In addition to economic plants that can be extensively cultivated (see pages 533 and 537), a number of plants of secondary importance are mentioned, for instance, a species of very early watermelon, with a thick rind, which grows on the poorest soil and is extensively shipped because it can withstand, uninjured, journeys of 2 to 3 weeks; a winter muskmelon cultivated in Cæsarea; a medicinal desert plant, *Citrullus colocynthis;* the Arab "Akub" (*Gundelia tournefortii*), the white juicy shoots of which are eaten like artichokes; wild "artichokes" (*Cynara syriaca* and *C. auranitica*); a desert tannin plant, *Tamarix articulata;* and a plant for the fixation of desert sand dunes, *Calligonum comosum.*

FIELD CROPS.

Pastures in New York (*New York Cornell Sta. Bul. 280, pp. 355–397, pl. 1, figs. 12*).—This bulletin contains 4 separate papers.

I. *New York pastures*, P. J. White (pp. 355–375).—This paper discusses pastures and pasture plants, and the characteristics of some of the more important grasses and clovers. Some grass mixtures are recommended and methods of pasture management outlined.

II. *The Prewick pasture*, P. J. White (pp. 375–385).—The land in this pasture produced an oat crop in 1903 and a rye crop in 1904, since which it has been in pasture. Five check plats were seeded to 20 lbs. of Kentucky blue grass per acre which did not furnish satisfactory grazing until 3 years after seeding. A plat seeded with 20 lbs. of redtop per acre formed an excellent stand by the end of the first year. By June, 1908, 80 per cent of the herbage was of this grass, 10 per cent Kentucky blue grass, and the remainder miscellaneous grasses and weeds. A plat seeded with 36 lbs. of meadow fescue per acre produced only half a stand and by June, 1907, had only 10 per cent meadow fescue, the remainder being blue grasses, clover, and weeds. A sowing of 20 lbs. of timothy per acre produced good results, 90 per cent of the herbage in June, 1907, being timothy. A sowing of 28 lbs. of orchard grass per acre resulted in three-fourths of a stand at the end of the first year, and a very poor stand in 1907, as Canadian blue grass and weeds had come in. Seeding with 32 lbs. of smooth brome grass per acre failed to secure a stand even after 3 sowings, but on a gravelly knoll on another farm proved a successful pasture plant. Seeding with a mixture of 12 lbs. of meadow fescue and 10 lbs. each of redtop and Kentucky blue grass resulted in one of the best plats. Redtop and timothy predominated the first year. By 1907, Kentucky blue grass, redtop, and meadow fescue predominated. Seeding with a mixture of 8 lbs. each of Kentucky blue grass, redtop, meadow fescue, and meadow foxtail resulted in a failure of meadow foxtail to appear during the first season, although it furnished 20 per cent of the herbage in 1907, 30 per cent being Kentucky blue grass, 30 per cent redtop, 10 per cent meadow fescue, and 10 per cent clover and weeds. Seeding with 8 lbs. each of Kentucky blue grass, redtop, and meadow fescue, 6 lbs. of timothy, and 4 lbs. of meadow foxtail resulted in the failure of meadow foxtail and meadow fescue to become important in the herbage. Timothy and redtop soon predominated after a sowing

of 8 lbs. each of red top and Kentucky blue grass, and 6 lbs. each of timothy, orchard grass, meadow fescue, and meadow foxtail, but meadow foxtail had become prominent by 1907 and Kentucky blue grass now prevails. On other plats on which a mixture of from 10 to 13 kinds of seed were sown, Kentucky blue grass became prominent. Orchard grass did little good, although meadow foxtail and white clover became important. Little perceptible difference in growth of grass followed the applications of different fertilizer mixtures, but the plats receiving nitrate of soda with or without lime were more closely grazed than those that received manure.

III. *The Roberts pasture*, I. P. Roberts (pp. 385–391).—In 1877, this field produced oats and in 1878 a crop of wheat in which 2 qt. of timothy per acre were sown. In the spring of 1879, 2 qt. of timothy and 4 qt. of clover (1 part alsike and 2 parts medium red clover) per acre were sown broadcast. The subsequent progress of the field is briefly reviewed and the author suggests that in addition to the seed sown 5 lbs. each of orchard grass, Kentucky blue grass, and redtop might have been profitably sown. This pasture, after it was well established, carried 3 times as many cattle per acre as the average New York pasture because the clovers were retained, early pasturing or overstocking was not permitted, and mowing early in June prevented the ripening of the grass from checking its tillering.

IV. *The cost of pasture land in different States*, G. F. Warren (pp. 391–397).—The author presents the results of investigations of pasture values throughout the country. The average results for each section are stated in the following table:

Cost of pasture land.

Section.	Months used.		Cost of land sufficient to pasture one cow one month.
	Actually used.	Equivalent to full feed.	
North Atlantic States	5.5	4.1	$18
Corn belt	6.6	6.0	27
Middle West, outside main corn belt	5.9	4.8	21
"Blue grass region"	8.6	6.9	31
Southern States	8.3	7.3	6
Arid regions	9.0	9.0	10
Western moist and irrigated land	7.3	6.9	13

The hay crop, W. P. Brooks (*Massachusetts Sta. Bul. 134, pp. 68, figs 3; reprint from Mass. [Bd.] Agr. Bul. 3, pp. 5–68, figs. 3; Agr. of Mass. 1904, pp. 357–376; 1905, pp. 360–382; 1906, pp. 421–436*).—This consists of 3 papers.

I. *The hay crop in Massachusetts* (pp. 5–24).—This paper outlines the status of the hay crop in Massachusetts, reviews the work of the station on this subject, and makes recommendations, in the light of experimental data, as to pasture management.

II. *The management of mowings* (pp. 25–47).—Some important grasses and clovers are described, mixtures for sowing recommended, and suggestions made for fertilizing meadows, keeping down weeds, and the care of mowings.

III. *Clovers: Their value, characteristics of varieties and methods of production* (pp. 48–68).—A discussion of the value of clovers to the farm is followed by a description of a number of varieties and directions for clover production and curing in Massachusetts.

The relative value of corn, oats, wheat, and hay in a four-course rotation during 25 years, T. F. HUNT (*Pennsylvania Sta. Rpt. 1909, pp. 21-26, pl. 1*).—The data contained in this article have already been reported from somewhat different standpoints (E. S. R., 21, p. 220).

A corn-oat-wheat-hay rotation was grown under 24 different fertilizer treatments. The total average weight of corn per acre during the 25 years was 6,062 lbs. valued at $29.67; of oats 2,909 lbs. at $14.49; of wheat 3,291 lbs. at $18.47; and of hay 3,609 lbs. at $18.05. The grain yields were about 50 bu. of corn, 38 bu. of oats, and 20 bu. of wheat per acre, with a little less than 2 tons of hay per acre. The average annual return from this rotation was $20.17, while the estimated average annual return from a corn-corn-oat-wheat-hay rotation would have been $20.45, or from a corn-corn-oat-wheat-hay-hay rotation $21.71. The untreated plats yielded crops valued at $15.76 per acre, those treated only with mineral fertilizers $21.13, and those treated with yard manure $22.25.

Forage plants for western Washington, W. H. LAWRENCE and H. L. BLANCHARD (*Washington Sta. Bul. 2, spec. ser., pp. 5-45*).—This bulletin discusses forage crops and gives directions for the production in western Washington of root crops, cabbage, thousand-headed kale, legumes, grains, grasses, and potatoes. A table of quantities per acre to sow of different kinds of seed is given.

Results of cooperative experiments in agriculture, C. A. ZAVITZ and W. P. GAMBLE (*Ann. Rpt. Ontario Agr. and Expt. Union, 31 (1909), pp. 13-43*).—These pages report the results of experiments in which 4,856 men cooperated. The principal results of these cooperative tests are stated in the following table:

Highest average yields secured in tests of varieties of field crops.

Kind of crop.	Number of tests.	Variety.	Percentage by which variety second in yield was lower in value.	Yield per acre.
				Bushels.
Oats	133	Siberian	4	41.60
Six-rowed barley	30	O. A. C. No 21	12	34.45
Two-rowed barley	3	Hanna	12	33.88
Hull-less barley	15	Guy Mayle	19	26.24
Spring wheat	12	Wild Goose	26	22.23
Buckwheat	3	Rye	12	21.12
Spelt Emmer	8	Common emmer		45.38
		Red spelt		29.76
Winter wheat	21	Imperial Amber	16	24.11
Winter rye	10	Mammoth	39	28.07
Field peas	45	New Canadian Beauty	12	21.29
Field beans	13	Marrowfat		29.36
Corn for grain	10	Genesee Valley	21	45.86
				Pounds.
Mixtures	7	Daubeney oats / Mandscheuri barley	26	1,518
				Tons.
Mangels	7	Ferry Yellow Leviathan	28	31.51
Sugar beets	7	Rennie Tankard Cream	5	24.95
Swedes	3	Steel-Briggs Good Luck	3	25.00
Fall turnips	3	Red Top White Globe	−12	29.45
Carrots	8	Steel-Briggs Improved Short White	−6	21.90
Fodder corn	8	Henderson Eureka	6	18.19
Sorghum	4	Early Amber sugar cane		6.23
Grass peas and vetches	4	Hairy vetches	14	8.30
Rape, kale, and cabbage	4	Sutton Earliest Drumhead cabbage	6	16.76
				Bushels.
Late potatoes	73	Empire State	15	177.73
Medium potatoes	96	Burpee Extra Early	8	193.60
Early potatoes	220	Extra Early Eureka	12	181.46

In fertilizer tests with winter wheat, swedes and potatoes, fields fertilized with cow manure produced higher yields than those fertilized with any

mineral, while a complete fertilizer stood second in size of crop secured and first in tests with oats, corn, and mangels in which manure was not used. The results of these crops were obtained in from 15 to 74 tests covering periods of from 3 to 8 years. On swamp soils an application of 500 lbs. superphosphate, 160 lbs. muriate of potash, and from 150 to 160 lbs. nitrate of soda resulted in higher yields of corn, potatoes, oats, rape, millet, and mangels than with any other fertilizer or manure tested.

[The Woburn field experiments], J. A. Voelcker (*Jour. Roy. Agr. Soc. England, 69 (1908), pp. 337-357*).—The work of 1908 was a continuation without change in general plan of that previously noted (E. S. R., 21, p. 229).

Manure taken from the feeding boxes March 19, and kept covered with earth, had lost 47 per cent of its weight by October 16. During the thirty-second season of the continuous wheat growing tests, unmanured wheat produced 12½ bu. per acre, or 2 bu. above the average of the last 10 years. The highest yields, 28½ bu. per acre, followed applications of minerals and 2 cwt. of nitrate of soda per acre. An application of the same minerals and 1 cwt. of nitrate of soda was followed by a yield of 26.2 bu. With farmyard manure there was produced 24.3 bu., but with 4 cwt. rape dust only 16.6 bu. Results on other plats indicated that the presence of phosphates is more essential than that of potash. When sulphate of ammonia was used alone there was no crop. With 5 cwt. of lime per acre the yield was 3 bu. A plat to which 2 tons of lime had been applied in 1897 produced 22.9 bu. per acre in 1908, while a renewal of this application in 1905 resulted in a yield of 18.7 bu. in 1908. "Heavy dressings of sulphate of ammonia when continuously applied will run land out where lime is deficient."

The manure applied to barley on the same field decreased 39 per cent in weight between March 19, 1907, and February 20, 1908. The need of lime was more emphasized on the barley plats than with wheat. There was practically no crop on the plat treated with 5 cwt. of lime and with sulphate of ammonia, while an application of 2 tons per acre in 1907 appeared to be worked out, as the plat was overgrown with spurry. The unmanured plats produced 6 bu. per acre as compared with an average of 12½ bu. for the past 10 years. The highest yield, 24.4 bu. per acre, was produced with farmyard manure. With minerals and nitrate of soda there was produced 22 bu. per acre, and with 1 and 2 cwt. of nitrate of soda alone 14.4 and 18.1 bu. per acre, respectively. The influence of potash as compared with phosphates was less marked than in the previous year. Rape dust proved much inferior to farmyard manure. The sulphate of ammonia plats produced very poor crops or entire failures.

In a series of rotation experiments, the fertilizing value of decorticated cotton cake and maize meal fed to sheep was tested. A rotation of wheat following mustard showed little difference in the manurial value of these 2 feeds. In rotation of barley after swedes fed off on the land, the decorticated cotton cake plat produced approximately 1½ times as much grain as the maize meal plat and twice as much as the plats on which the swedes were fed off without cake or corn. In a third rotation mustard after barley produced a somewhat better crop on the decorticated cotton cake plat, and the same was true of a rotation of swedes after wheat.

Plats to which lime had been given last in 1904 surpassed those to which mineral fertilizers were applied. Wheat produced the highest yield, 1,498 lbs. of grain per acre, after mustard plowed in with lime; the second highest yield, 1,383 lbs. of grain, after rape plowed in with lime; and the poorest yield after vetch plowed in with mineral manures.

The use of nitro lime or calcium cyanamid and ¾ cwt. of sulphate of ammonia supplying the same amount of nitrogen resulted in yields of 34.9 and 32.77 bu.

of barley per acre, respectively. The difference is attributed in part to the fact that the calcium cyanamid contains considerable lime and the soil is deficient in this substance. On using 2 tons of lump lime and 10 cwt. of ground lime per acre there were yields of 41.03 and 30.47 bu. of barley per acre respectively, as compared with 24.06 bu. on an untreated plat. Land which was treated with sulphate of ammonia and nitro lime had a thick growth of the weed *Polygonum aviculare*, of which the limed plats were almost free. Canadian seed, Provence seed, and American seed produced yields of 9 tons 3¾ cwt., 6 tons 13 cwt., and 6 tons 4 cwt. of green alfalfa per acre, respectively. Seed inoculation did not produce a gain in a single instance with alfalfa, but showed a slight advantage in the case of Mammoth White clover, and a marked increase in yield with Dutch White clover.

When a standard application of 12 tons of farmyard manure, 3 cwt. of superphosphate, and 1 cwt. of sulphate of potash per acre was supplemented by different mixtures, the application of 1 cwt. of sulphate of ammonia apparently increased the yield of potatoes by 1 ton 12 cwt., while nitrate of soda and nitro lime supplying the same nitrogen apparently improved the yield by 1 ton 2 cwt. and 8 cwt. 2 quarters respectively, and 3 and 6 cwt. of magnesia apparently increased the crop by 13 cwt. and 1 ton 5 cwt. respectively. Invicta proved the most productive variety of swedes tested. The use of 70 lbs. of nitrate of soda produced lower yields than the standard dressing alone, or that of standard dressing with 6 cwt. per acre of a basic turnip manure containing lime. The latter also, however, produced lower yields than the standard dressing alone.

Yellow Globe mangel was the highest yielding variety tested. Top-dressings in all cases resulted in a marked increase in yield, 1 cwt. of nitrate of soda apparently excelling 1 cwt. of nitro lime. Common salt proved advantageous up to 6 cwt. per acre with little to choose between 2 and 4 cwt.

The highest yield of hay, 2 tons 1½ cwt., followed an application of 12 tons of farmyard manure per acre, while applications of (1) 10 cwt. basic slag and 1 cwt. sulphate of potash, and (2) 10 cwt. basic slag and 1 cwt. nitrate of potash resulted in almost equally good yields. The lowest yields in the experiment followed an application of 2 tons of lime per acre.

Rotations, P. McConnell (*Jour. Roy. Agr. Soc. England, 69 (1908), pp. 17–32*).—Rotations are discussed with special reference to the cleaning of land, economy of plant food, insect and fungus pests, soil texture, climate, arrangement of fields, distribution and supply of labor, variety of crops, and live stock. A summary of rotations as returned by correspondents includes courses of 3, 4, 5, 6, and more years.

[Variety tests with peanuts and fodder crops], A. J. Brooks (*Imp. Dept. Agr. West Indies, Rpts. Bot. Sta. Dominica, 1908–9, pp. 32–35*).—Among 4 varieties of peanuts the Spanish and Carolina Running varieties yielded 1,940 and 1,137 lbs. per acre, respectively. Bascom corn and teosinte produced 12.7 and 12 tons of fodder per acre, respectively, and proved suitable for poor sandy soil in a dry situation. Guinea grass and Rural Branching Doura produced 11.6 and 7.5 tons of fodder per acre, respectively.

[Agricultural and botanical explorations in Palestine], A. Aaronsohn (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 180, pp. 26–33, 36–52, pls. 8, figs. 2*).—The carob tree yields a greater quantity of food matter per acre on arid soil than the best alfalfa, the pods containing 40 per cent or more of sugar and from 7 to 8 per cent of protein. It appears that berseem (*Trifolium alexandrinum*) originated in Palestine, since it grows wild there as do *T. carmeli*, *T. panormitanum*, and *T. supinum*. *Atriplex palestina*, *A. halimus*, and *A. leucoclada* are well adapted to alkaline soils. *A. leucoclada* grows from 3 to 6 ft. high and is relished by sheep and camels. The stems and the leaves of the Palestine

chick-pea are corrosive because covered with crystals of oxalates and other hygroscopic salts which are thought to render the plant drought resistant by condensing atmospheric humidity. Sesame grows on sandy clay soils where the rainfall is 16 in. or less, but requires thorough preparation of the soil. Its lack of uniformity in ripening necessitates several harvestings by hand.

The author discusses the historical interest of wild wheat, the discovery of wild emmer, the importance of the brittle rachis of the primitive cereals, and gives an account of his rediscovery of wild emmer (*Triticum dicoccum dicoccoides*) in Palestine and Syria. This prototype of true wheat was found in a number of forms varying from 2 ft. high at Rosh Pinar to 40 in. at Rasheyya. It is indigenous to the regions of Mount Hermon, but rarely appears on cultivated soils. It is always found in company with wild barley.

Cotton field and orchard of the experiment field in the Hunger Steppe in 1907, M. Bushuyev (*Abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 6, pp. 900, 901*).—The field and garden crops most profitably cultivated in the Hunger Steppe are alfalfa (fertilized with manure and superphosphate), cotton, beets, corn, sunflower, tobacco, winter barley, tomatoes, and cucumbers. The more profitable orchard and forest trees in the same region are plum, apricot, peach, American ash, poplar, white acacia, and mulberry.

[Variety and manurial tests and experimental sowings of field crops], H. W. Potts et al. (*Rpt. Dept. Agr. N. S. Wales, 1909, pp. 57–61, 64–66, 77–80, 90, 91*).—A progress report of experimental sowings of a large number of field crops at different farms is given.

At the Hawkesbury Agricultural College, Zealand and White Essex common wheats produced 2 tons 11 cwt. and 2 tons 7 cwt. of hay per acre, respectively, while among the macaroni wheats Velvet Don and Sarragolla produced 2 tons 10 cwt. and 2 tons 8 cwt. of hay per acre, respectively. Among 11 varieties of oats Amarilla, Algerian, and White Tartarian produced yields of from 3 to 3½ tons of hay per acre. In a fertilizer experiment with swedes, 150 lbs. of blood apparently surpassed 1 cwt. of nitrate of soda or 95 lbs. of sulphate of ammonia as a supplement to 200 lbs. of superphosphate and 100 lbs. of sulphate of potash, while with mangels the application of 2 cwt. of superphosphate per acre was followed by a much larger yield than when the same amount of superphosphate was used with kainit or nitrate of soda or both. Equal yields of corn followed the application of (1) 84 lbs. of sulphate of ammonia and (2) a mixture of 140 lbs. of superphosphate, 84 lbs. of sulphate of potash, and 84 lbs. of sulphate of ammonia.

At the Wagga Experiment Farm, Algerian oats produced the maximum yields of 56 bu. and 33 lbs. per acre. Limed and unlimed land produced substantially the same yields without manure and with every application of fertilizer, except one of 2 cwt. of superphosphate, in which case the yield on the limed land was apparently increased 50 per cent.

At the Glen Innes Experiment Farm, Bobs and Minnesota B. Stem wheats produced the highest yields, 40 and 38 bu. per acre, respectively, while in a field trial, Jonathan produced 36 bu. per acre. In a variety test of oats, the maximum yield of hay was produced by White Tartarian. Among potatoes, Factor produced the maximum yield of 6 tons 13½ cwt.

At the Moree Irrigation Farm, Skinless barley cut for green feed and allowed to head out again yielded 17½ bu. per acre, while Algerian oats sown at the rate of 1¼ bu. per acre on land irrigated twice and limed at the rate of 200 lbs. per acre produced 2 tons 17½ cwt. of hay. Alfalfa, sown at the rate of 12 lbs. per acre through a drill from which the tubes had been removed from the hose, promises satisfactory results. An even distribution of the seed was secured

by tying the tubes at equal distances to laths following the seeder with a harrow.

[Results of experiments with ensilage hay, barley, oats, and wheat], A. J. PERKINS and W. J. COLEBATCH (*Jour. Dept. Agr. So. Aust., 13 (1910), Nos. 8, pp. 652–662; 9, pp. 736–745*).—A sowing of a mixture of 60 lbs. of Calcutta oats, 100 lbs. of King Early wheat, 4 lbs. of alfalfa, and 8 lbs. of vetch per acre yielded 9 tons 14 cwt. of green stuff per acre. Recent averages in yield of ensilage from mixed sowings of wheat, oats, and vetch have ranged from 5 to 12 tons per acre. Recently-chaffed and unweighted ensilage in a pit 13 ft. by 18 ft. 10 in. by 14 ft. deep averaged a little over 31½ lbs. per cubic foot. A mixture of oats and wheat bound in sheaves lost in drying 71.61 per cent of their original growth during 1909. The average of the losses during 4 successive seasons was 69.7 per cent, so that 10 tons of green stuff was reduced to a little over 3 tons of hay.

In a manurial test with wheat, 3 times as great a yield was secured after the application of a mixture of 195 lbs. of superphosphate, 100 cwt. of nitrate of soda, and 1 cwt. of muriate of potash as was secured from the application of the superphosphate alone. The substitution of 1 cwt. of sulphate of potash for the muriate in the same mixture was followed by an increased yield of 2 bu. 15 lbs. In a field test, among 26 varieties of wheat averaging 25 bu. 15 lbs. per acre, Federation (selection 1) produced the highest yield, 33 bu. 20 lbs. per acre. On variety plats Mahmoudi durum wheat produced the highest yield, 36 bu. 13 lbs. per acre, while the pedigreed college wheats, King Red (selection 4), Late Gluyas (selection 4), and Bearded Gluyas (selection 4), yielded 33 bu. 41 lbs., 33 bu. 8 lbs., and 30 bu. 35 lbs. per acre, respectively.

Alfalfa as a crop in Massachusetts, W. P. BROOKS (*Massachusetts Sta. Circ. 18, pp. 4, fig. 1*).—This circular gives directions for the production of alfalfa in Massachusetts and states the composition of alfalfa, alsike clover, and medium red clover hays.

The production of alfalfa, R. G. OSÉS (*Estac. Expt. Agron. Cuba Bol. 19, pp. 65, figs. 7*).—This bulletin contains general information of interest to the grower of alfalfa in Cuba. The various species and varieties are discussed, as well as preparation of the soil, seed selection, inoculation, fertilization, cultivation, harvesting, and storing. Information is given on irrigation and on the insect and other pests of alfalfa.

Corn production in the upper peninsula of Michigan, L. M. GEISMAR (*Michigan Sta. Spec. Bul. 52, pp. 5–8*).—This publication gives directions for the production of corn in the upper peninsula of Michigan and discusses some varieties adapted to that region.

Increasing protein and fat in corn, L. H. SMITH (*Amer. Breeders Mag., 1 (1910), No. 1, pp. 15–21*).—The investigations reported in this article have been previously noted from other sources (E. S. R., 20, p. 531; 21, p. 134).

Cotton production, 1909 (*Bur. of the Census [U. S.] Bul. 107, pp. 64, dgms. 3, maps 12*).—This bulletin reports the yearly production of cotton of the United States for the period 1905–1909 by States and counties, and of the world during 1907–1909, inclusive, by countries. The supply and distribution of cotton in the United States for specified varieties in 1909–10 are stated and general information given with reference to the investigations of the Government with relation to cotton.

Notes on publications relating to cotton, January, 1909, to January, 1910, W. L. BALLS (*Cairo Sci. Jour., 4 (1910), No. 44, pp. 114–122*).—These pages contain reviews of some of the more notable publications on cotton published in French and English during 1909.

Variety test of oats, 1906–1908, C. F. NOLL (*Pennsylvania Sta. Rpt. 1909, pp. 106–112*).—During the years 1906, 1907, and 1908, the Japan variety yielded 35.3, 65.3, and 56.7 bu. per acre, respectively, but in 1907 was exceeded by Sixty-Day and Silver Mine with yields of 68.7 and 65.9 bu. per acre, respectively. It also stood first in average yields for the period 1905 to 1908 with 51.7 bu. per acre. During an 18-year period it averaged 50.68 bu., during 13 years 52.19, during 11 years 52.37, and during 10 years 52.57, but for the 10-year period was exceeded by White Maine with an average of 56.31 bu. per acre. During a 9-year period Silver Mine stood first with 53.6 bu., during an 8-year period Czar of Russia with 54.88 bu., and during a 2-year period Sixty-Day with 59.22 bu.

The seed of a number of varieties treated with formalin showed no traces of smut, but untreated seed of the Irish Victor yielded 16 per cent of smutted heads, Japan 11 per cent, New Danish White 8 per cent, Long White Tartar 7 per cent, Czar of Russia 20 per cent, Fourth of July 16 per cent, and Big Four 18 per cent.

Variety test of potatoes, 1906–1908, C. F. NOLL (*Pennsylvania Sta. Rpt. 1909, pp. 113–124*).—This article is largely a reprint of Bulletin 98 previously noted (E. S. R., 23, p. 139).

Studies in Indian fiber plants. I, On two varieties of sann (Crotalaria juncea), A. and G. L. C. HOWARD (*Mem. Dept. Agr. India, Bot. Ser., 3 (1910), No. 3, pp. 177–189, pls. 3*).—The botanical and cultural characters of a local variety of sann-hemp are compared with those of the Jubbulpore variety. Yields and chemical analyses are given and the results of tests of sann as a green manure for the tobacco crop are reported. References are given to the literature of the subject.

Soy beans the basis of Manchurian commerce, R. HOAGLAND (*Minn. Farm Rev., 15 (1910), No. 6, pp. 121–123, 138, 139*).—This article discusses the commercial importance of the soy bean in Manchuria, outlines its limits of growth in that country, and reports chemical analyses of Manchurian soy beans and soy-bean cake.

Growing sugar beet seed in South Dakota, J. H. SHEPARD (*South Dakota Sta. Bul. 121, pp. 685–698, figs. 2*).—This is a continuation of Bulletin 117, previously noted (E. S. R., 22, p. 535) and presents the results in 1909.

The ground occupied was subsoiled to a depth of 24 in. The minimum sugar content required of beets for their retention in the experiment was lowered to 14 per cent for this season, as had favorable weather permitted a content of 18 per cent would have been reached in a few days longer. The great fluctuation from the original type is disappearing. A table presents the number of mother beets of each station number, the number analyzed in 1909, their average sugar content, weight in grams, lowest sugar content, and highest sugar content. The 55 singles saved for 1909 include the very best beets grown in each variety.

Variation and correlation in timothy, C. F. CLARK (*New York Cornell Sta. Bul. 279, pp. 301–350, figs. 12, charts 9*).—A brief statement is given of the manner of conducting the experiments with a review and bibliography of similar work.

Variations from 0.25 to 0.75 in. in leaf width; from 4 to 15 in. in length; from 3 to 8 in. in number of leaves per stem; from 1 to 12 in. in length, and from 0.2 to 0.4 in diameter of head; from 18 days in earliness of blooming and from 8 to 23 days in length of blooming period are reported. The leaves varied from flat to boat-shaped, the stems from erect to decumbent in direction, and both stems and heads from green to reddish or bluish purple in color. Some plants behave as annuals, while on some plats a large percentage of the plants are still vigorous, although 6 years old. Single plants varied in stooling power from

a few culms to 280. A few were nearly immune to rust. Weight showed greater variation than any other character studied statistically. Charts show the meteorological conditions during the experiment and the place variations in bloom, width, and weight. The following table shows the principal correlations observed:

Correlation of characters in timothy.

Year.	Characters correlated.	Correlation.
1905	Earliness and height	-0.052 ± 0.011
1906	do	-0.108 ± 0.011
1907	do	-0.236 ± 0.011
1905	Earliness and weight	0.119 ± 0.011
1906	do	-0.047 ± 0.011
1907	do	-0.186 ± 0.011
1905	Duration of bloom and height	-0.052 ± 0.011
1906	do	0.004 ± 0.011
1907	do	-0.138 ± 0.011
1905	Duration of bloom and weight	-0.192 ± 0.011
1906	do	-0.042 ± 0.011
1907	do	-0.154 ± 0.011
1905	Weight and height	0.274 ± 0.011
1906	do	0.454 ± 0.009
1907	do	0.718 ± 0.006
......	Weight 1905 and weight 1906	0.474 ± 0.009
......	Weight 1906 and weight 1907	0.550 ± 0.008
......	Weight 1905 and weight 1907	0.382 ± 0.010
......	Height 1905 and height 1906	0.519 ± 0.008
......	Height 1906 and height 1907	0.585 ± 0.008
......	Height 1905 and height 1907	0.486 ± 0.009

Studies in Indian tobaccos. II. The types of Nicotiana tabacum, A. and G. L. C. Howard (*Mem. Dept. Agr. India, Bot. Ser., 3 (1910), No. 2, pp. 59–176, pls. 58*).—This discusses the stability of types of *N. tabacum*, gives a classification of types, and describes and illustrates a large number of them.

Wheat (*Jour. Bd. Agr. [London], 17 (1910), No. 3, Sup. 4, pp. 84, fig. 1*).—This contains a series of papers, read at the Winnipeg meeting of the British Association for the Advancement of Science, August, 1909, on the economic position of wheat growing with special reference to northwestern Canada, factors determining the yield of wheat, wheat breeding, seed selection, the baking qualities of flour from Canadian wheats, the chemical work on Canadian wheat and flour, strength and quality in wheat flour, and the chemical properties of wheat flour. A bibliography of the last-named subject is given.

Cultural methods for wheat in dry countries (*Bul. Off. Gouvt. Gén. Algérie, 1910, No. 12, Sup., pp. 199–217*).—General directions are given for the production of wheat under dry farming conditions. Rotations are outlined and suggestions given for the management of fallows.

The cultivation of "stronger" and more valuable wheats for export from the Punjab, W. C. Renouf (*Dept. Agr. Punjab, Bul. 1, 1910, pp. 10*).—Correspondence on the improvement of strength in wheats grown in the Punjab is reported.

HORTICULTURE.

[Fruits and plants to be used as stocks recommended for introduction into the United States], A. Aaronsohn (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 180, pp. 13–27, figs. 5*).—The author describes a number of fruit trees growing in Palestine which it is believed might be successfully used as stocks for extending fruit culture in certain regions of the United States, where fruit growing is now either unsuccessful or limited. These include *Zizyphus spina-christi*, *Z. lotus*, and *Paliurus spina-christi*, recommended as stock for the Chinese jujube; *Pistacia terebinthus*, *P. palæstina*, and *P. atlantica*, as stocks

for the pistache nut; *Amygdalus communis*, *A. orientalis*, *Prunus microcarpa*, *P. ursina*, and *P. cerasia* as stocks principally for almonds and apricots; *Cratægus azarolus*, *C. orientalis*, and *C. sinaica* as stocks for pears and possibly apples, and *Pyrus syriaca* as a pear stock. The possibility of securing valuable results from these plants by hybridization and selection is also suggested. Among these plants are included stocks adapted for moist, arid, and alkaline soils, as well as for both high and low altitudes.

In addition to the wild types suggested for stocks, notes are given of a number of cultivated fruits considered worth trying in the United States, including apricots, quinces, pomegranates, olives, figs, dates, grapes, and oranges.

Orchard management, U. P. HEDRICK (*New York State Sta. Circ. 11, pp. 13*).—This circular contains a popular discussion of the principles underlying orchard management. Consideration is given to the selection of location, land, and varieties, climatic conditions, pruning, cultivation, intercrops and cover crops, diseases, and insect pests. The chief results secured during the first 5 years of the soil management experiment in the Auchter orchard (E. S. R., 21, p. 238) are also given and discussed.

Homemade orchard heater, J. MENDENHALL (*West. Fruit Grower, 21 (1910), No. 8, p. 13*).—The author briefly describes an improvised orchard heater made of cobblestones which has been successfully employed. The stones were placed in a circle, the small ones in the center and the large ones on the outside; coal was used for fuel. A common bucket full of coal lasted about 2½ hours, and the stones retained heat for a number of hours after the fires were burned out.

Fruit production of the British Empire, J. McCALL (*Jour. Roy. Hort. Soc. [London], 36 (1910), No. 1, pp. 98–106*).—A statistical discussion of the fruit production in the various portions of the British Empire.

Apple orchard survey of Niagara County, M. B. CUMMINGS (*New York Cornell Sta. Bul. 262, pp. 279–320, figs. 15*).—The third of a series of orchard surveys being made of the apple growing counties of New York (E. S. R., 17, p. 367) is here reported. The work in Niagara County was carried on by a number of inspectors in 1905 and 1906 and completed by the author in 1907.

About 24,190 acres or 7.2 per cent of the area of the county is planted to apple orchards. Of these over 716 orchards, containing 6,000 acres in representative districts, were examined relative to the age of the trees, soils, drainage, fertilization, tillage, enemies of the apple, spraying, pruning, distance between trees, ownership, yields, prices, income per acre, varieties, etc. Most of the data collected covers a period of 5 years.

The survey as a whole shows that the apple acreage in Niagara County has been on the decline since 1880, a majority of the orchards having been planted 30 to 45 years ago. The San José scale deterred many from planting during the past 7 years. About 30 kinds of apples are grown in the county of which the chief varieties are Rhode Island Greening, Baldwin, and Northern Spy. The crop is normally marketed in barrels. Since the spread of the San José scale, however, resulting in the production of much inferior fruit the cider mill and the evaporator have come to the fore. In 1905, 84.1 per cent of the crop was evaporated. The average annual yield per acre for the 5-year period, 1902–1906, was 192.4 bu. and the average gross income per acre for the same period was $109.20. The average price per barrel was $1.97.

The yields were influenced by the soil types and much loss was sustained because of lack of drainage. About 52.2 per cent of the orchards had good drainage. Sixty-one per cent of the orchards receive barnyard manure, and only 4 per cent are given commercial fertilizers. Cover crops are used in nearly 10 per cent of the orchards. The 3-year average income per acre where no fer-

tilizer was used was $73, as compared with $83 with barnyard manure. $82 with commercial fertilizers, $75 with straw mulch, and $78 with cover crop treatment. About 51 per cent of the orchards were tilled for 5 or more years and 29 per cent were in sod for the same period. The 5-year averages show a larger yield and greater income for tilled than untilled orchards. Of the sod orchards those not pastured gave the largest average yields. It appears that the unpastured sod orchards received better care as to pruning, spraying, etc., and were generally younger than the pastured sod orchards. Spraying was practiced in about four-fifths of the orchards, although very few of the scale infested orchards have been treated with scale killing mixtures. Paris green with Bordeaux mixture was most generally used. Taken as a whole the greatest yield, 577 bu. per acre and the largest income, $171 per acre, was secured with 3 sprayings as compared with an average yield of 261 bu. per acre and an average income of $45 per acre from unsprayed orchards.

The character of the pruning was good or fair in 66.7 per cent of the orchards. The trees in 47 per cent of the orchards were planted too close, the average distance between trees being 33.8 ft. Only 13.3 per cent of the orchards were held by tenants. During the previous 6 years the San José scale and the codling moth were the worst enemies of the apple. Collar rot was bad only in sections, generally on poorly drained land. The author calls attention to the need of better spraying and pruning and gives brief suggestions thereon.

The introduction by J. Craig, under whose direction the surveys are being carried on, contains a general outline of the work and historical notes on fruit growing in Niagara County.

Dwarf apples, U. P. HEDRICK (*New York State Sta. Circ. 12, pp. 8*).—With a view to determining the commercial possibilities of dwarf apples 3 orchards were located in different sections of the State in 1902 and 1903 by the station in cooperation with the State Fruit Growers' Association, the Eastern New York Horticultural Society, and the Western New York Horticultural Society. This circular outlines the work under way and states the results secured through the season of 1909.

A large number of varieties on Paradise, or true dwarf stock, Doucin, or half dwarf, and standard stocks are being compared. The fifth year from setting the 602 Paradise trees bore an average of 12.7 apples per tree; the 444 Doucins bore a fraction less than 6 apples per tree, and the 114 standards produced a half apple per tree. Only in one orchard, however, have the Paradise trees come in bearing appreciably earlier than the varieties on the other 2 stocks. In this case the crop was not large enough to be of any financial value until the fifth season from setting when the average for 165 trees was about one-third of a bushel. Thus far the claim as to greater size, higher color, and better flavor for the fruit of dwarf trees has not been borne out.

The increased difficulty of cultivation and the increased amount of pruning required appear to offset the greater ease with which dwarf trees may be sprayed and the fruit thinned. When standard and Paradise trees were compared the shallow rooted Paradise trees blew over more often from gales than low headed standards. It appears that the usually recommended planting distances of from 6 to 12 ft. apart for Paradise stock and 8 to 16 ft. apart for Doucin stock will need to be doubled under the methods of treatment usually given orchards in New York State.

Although the experiment has still some time to run the results as a whole thus far indicate that dwarf apples will not take the place of standard apples in commercial orchards, although a few sorts may be used in limited numbers for a commercial orchard of dwarfs.

A report on some trial shipments of cold storage apples, J. A. RUDDICK (*Canada Dept. Agr., Dairy and Cold Storage Comr. Branch Bul. 24, pp. 17*).—Some 6 lots of apples were placed in cold storage houses in Montreal, St. Johns, and London, Canada, and later shipped largely to Glasgow, Scotland. For the sake of comparison one carload of apples was held in an ordinary frost proof warehouse. The financial results secured with each lot are given in detail, together with a number of observations on the behavior of the apples. On the whole the temperature in the frost proof warehouse was from 3 to 10° too high during the first 6 weeks of storage. The keeping quality of the cold storage apples was noticeably better.

Special tests were made with Northern Spys and Greenings to determine the effect of early and late picking, two weeks elapsing between the two pickings. The later picked apples had the better color and appearance and showed better keeping qualities when taken from cold storage in the spring. The early picked Greenings particularly were badly scalded when removed from cold storage, while the later picked ones were almost free from that defect.

The advantage gained by the prompt cold storing of apples after picking is considered one of the most striking lessons to be drawn from the results of these trials. The experience in these trials points to the possibility and practicability of shipping carefully packed winter apples that have been promptly cold stored without repacking on removal from storage. It appears that the usual season for Greenings may be extended several weeks if the apples are well matured on the trees and placed in cold storage without delay after picking. The evidence secured indicates that exposure to a high temperature for any length of time after picking and before storage when the life processes are active in the apple will cause more injury than the same exposure to a similar high temperature after storage. Shipments of these cold storage apples made to Glasgow in April and May did not appear to have been highly remunerative.

The precooling plants of the Pacific Fruit Express Company (*Engin. Rec., 62 (1910), No. 5, pp. 125–128, figs. 9*).—Descriptions are given of the plants erected by this company in California for precooling perishable fruits, vegetables, and other products.

The date gardens of the Jerid, T. H. KEARNEY (*Nat. Geogr. Mag., 21 (1910), No. 7, pp. 543–567, figs. 20*).—A popular description of the date gardens of the Jerid at the northern edge of the Sahara, where the author obtained date palms for this Department's experimental work in date culture in Arizona and California.

Fig culture in North Carolina, F. C. REIMER (*North Carolina Sta. Bul. 208, pp. 187–206, figs. 13*).—A popular bulletin discussing fig culture with special reference to North Carolina conditions. Consideration is given to selection of locality, climatic requirements, soil, propagation, planting, cultivation and mulching, manures and fertilizers, irrigation, pruning and training, winter protection, harvesting and marketing, uses, varieties, and the cause of premature dropping of figs.

Report of the enological station of Haro for 1909, V. C. M. DE ZÚÑIGA (*Estac. Enol. Haro Mem., 1909, pp. 98, chart 1*).—This report is similar in character to those noted in previous years (E. S. R., 20, p. 839), summarizing the progress made in laboratory and field investigations, assistance rendered, etc.

On the abortion of the flowers of Coffea arabica, A. FAUCHÈRE (*Jour. Agr. Trop., 10 (1910), No. 106, pp. 99, 100*).—In a previous publication on the coffee plantations of Tonkin (E. S. R., 21, p. 637), Cramer reached the conclusion that the virescence and abortion of the flowers of *Coffea arabica* is a physio-

logical phenomenon caused by whatever affects the nutrition of the plant, whether climatological, pathological, or agrological. As a result of his observations in coffee plantations of various countries, the author is of the opinion that this abortion is often caused by too much shade and sometimes in conjunction with a too liberal application of green manures and of commercial fertilizers. It is also suggested that too severe pruning under heavy shade may cause the trouble. It is believed that this variety of coffee will do best when grown without shade.

Classification of the peony, L. D. BATCHELOR (*New York Cornell Sta. Bul. 278, pp. 223–298*).—This is the third progress report on the peony investigations (E. S. R., 20, p. 942), which are being cooperatively conducted by the American Peony Society and the Cornell Station with a view to correcting the confused nomenclature. The present report discusses the method of describing varieties, color comparisons, and horticultural classification, corrects previous descriptions which have proven to be either incorrect or incomplete, and describes a large number of varieties tested during the previous season on the station's plats. The peony was also studied on commercial trial grounds at Reading, Pa., and at Queens, Long Island. As in the previous bulletins the descriptions are given subject to such change as fuller experience warrants, since peonies seldom produce blooms that are typical of the variety until the young plants have become established.

The notes upon which the descriptions are founded were taken jointly by the author, B. H. Farr, and J. Dauphin.

The development of sweet peas (*Gard. Chron., 3. ser., 48 (1910), No. 1229, pp. 42, 43*).—This is an editorial in which consideration is given to the principal color sections into which sweet peas are now grouped with a view of showing the nature of the work still awaiting raisers of new varieties.

Mendel's law of heredity and its application to horticulture, C. C. HURST (*Jour. Roy. Hort. Soc. [London], 36 (1910), No. 1, pp. 22–52, pls. 8, figs. 15*).—A paper read before the Royal Horticultural Society in May, 1909.

FORESTRY.

The relation of the experiment station to forestry, C. E. THORNE (*Proc. Soc. Prom. Agr. Sci., 30 (1909), pp. 99–101*).—A short paper on this subject read before the Society for the Promotion of Agricultural Science.

The author points out that from a forestry standpoint the experiment station is concerned largely in aiding the farmer to develop his wood lot.

Protection of forests from fire, H. S. GRAVES (*U. S. Dept. Agr., Forest Serv. Bul. 82, pp. 48, pls. 10, fig. 1*).—The author discusses the character of forest fires (surface, ground, and crown fires), and the damage by fires, and gives an account of the various methods of preventing fires, including the disposal of slash, the establishment of fire lines, supervision, and patrol.

Detailed instructions are also given for fighting fires.

Windbreaks and hedges, C. B. WALDRON (*North Dakota Sta. Bul. 88, pp. 3–11, pls. 9*).—Popular directions are given for planting windbreaks and hedges, with notes on suitable varieties of trees and plants for this purpose.

[Forestry section] (*Rpt. W. Va. Conserv. Com., 1908, pp. 18–27*).—A general survey of forest conditions in West Virginia with recommendations relative to forest protection and extension.

The lumber history of Texas for 1909, J. C. DIONNE (*Texas Dept. Agr. Bul. 12, pp. 337–347, fig. 1*).—A statistical review of the lumber industry in Texas for the year 1909.

The new forestry law, C. A. Scott (*Kansas Sta. Circ. 10, pp. 4*).—This circular contains the text of the Kansas state forest law, which became effective March 15, 1909, with brief notes on the work under way.

The forest of Dean revisited, W. Schlich (*Quart. Jour. Forestry, 4 (1910), No. 3, pp. 198–203*).—A brief survey of silvicultural operations in the forest of Dean.

Forests in Finland: Development of timber and allied industries, C. J. Cooke (*Bd. Trade Jour. [London], 70 (1910), No. 714, pp. 225–227*).—A British consular report containing statistics relative to the extent of the forests in Finland, and the development of the timber and allied industries there.

About 50,000,000 acres, or 63 per cent of the whole area of Finland, is covered by forests, of which pine (*Pinus silvestris*), fir (*Picea excelsa*), birch (*Betula verrucosa* and *B. odorata*), are the more important species.

The Finnish government owns 13,000,000 acres of productive forest land, from which about 1,300,000 cubic meters, fixed measure (about 45,908,200 cu. ft.), of timber are consumed annually.

Report of the forestry branch for the year ended June 30, 1909, R. D. Hay and J. H. Maiden (*Rpt. Forestry Branch N. S. Wales, 1909, pp. 9, pls. 6*).—A brief progress report on forest operations for the year ended June 30, 1909, including an outline of the forestry work done by the government botanist during the same period. Tables of revenues and expenditures for the current year and a summary for each year since 1877 are given, together with imports and exports of dressed and undressed timber.

Progress report of forest administration in the Province of Eastern Bengal and Assam for the year 1908–9, M. Hill (*Rpt. Forest Admin. East. Bengal and Assam, 1908–9, pp. 68, map 1*).—This is the customary report on the administration of state forests in Eastern Bengal and Assam for the year 1908–9. It discusses alterations in areas, forest settlements, demarcation, forest surveys and protection, silvicultural operations and experiments, and exploitation. The important data, including financial results for the year, are presented in tabular form.

Administration report of the forest circles in the Bombay Presidency, including Sind, for the year 1908–9, G. P. Millett et al. (*Admin. Rpt. Forest Circles Bombay, 1908–9, pp. 177*).—Data similar to the above are given relative to the administration of state forests in the northern, central, and southern circles of the Bombay Presidency and for Sind.

Progress report of forest administration in Coorg for 1908–9, C. D. McCarthy (*Rpt. Forest Admin. Coorg, 1908–9, pp. 16*).—Data similar to the above are presented relative to the administration of state forests in Coorg.

The rotation of pine in the state forests of Prussia, Bavaria, Alsace-Lorraine, Hesse, and Anhalt, Martin (*Forstw. Centbl., n. ser., 32 (1910), No. 7, pp. 363–387*).—This is a report of an investigation relative to the best financial rotation for pine in these countries.

Some important species of trees of the Malay Archipelago, E. Carthaus (*Tropenpflanzer, 14 (1910), No. 7, pp. 341–348*).—The author briefly discusses the climatic conditions in the Malay Archipelago and gives a general account of a number of trees which are suggested for trial in the German African colonies.

The woods of the Ivory Coast at the Brussels Exposition and their industrial utilization, H. Courtet (*Agr. Prat. Pays Chauds, 10 (1910), No. 87, pp. 451–472*).—The descriptions include common and botanical names and the characters of the tree, bark, and wood, together with the habitat and economic use.

The ivory nut of Abyssinia, L. Planchon (*Bul. Mens. Acad. Sci. et Let. Montpellier, 1910, No. 6–7, pp. 165–175, figs. 5*).—The Abyssinia ivory nut (*Hyphaene*

thebaïca) is described relative to the botany of this palm and the structure of the fruit and seed.

Wattle growing for bark, L. E. TAYLOR (*Transvaal Dept. Agr., Farmers' Bul. 100, pp. 15, pls. 6*).—This is a popular guide for prospective planters. Part 1 discusses in detail the formation of the plantation, part 2 deals with the exploitation of the bark and timber, and part 3 with regeneration. Concluding remarks discuss protection from fire and injurious insects.

Some factors which influence the yield of resin from Pinus longifolia, E. A. SMYTHIES (*Indian Forester, 36 (1910), No. 5, pp. 278–283, figs. 5*).—The discussion of these factors is based upon the systematic tapping of chir pine (*P. longifolia*) which has been carried on in the Naini Tal division of the Indian forest service for the last 15 years.

The author finds that the yield of resin is strongly affected by the seasons, hot weather giving a maximum. The yield also depends on the year of tapping, the third year usually giving the best results. The number and quality of the laborers employed, together with the health of the tree, are also factors. The yield decreases as the limits of distribution of the species are approached.

The behavior of chestnut wood under destructive distillation and the resulting products, G. BORGHESANI (*Chem. Ztg., 34 (1910), No. 69, pp. 609, 610*).—Destructive distillation of chestnut wood as conducted by the author is reported, together with a table showing the percentage of coal and distillation products obtained from the trunk, branches, and root.

The results indicate that by using the destructive distillation process there is a greater increase in the coal residue of the trunk than of the branches, but that the reverse is true of the products of distillation. The roots hold an intermediate position in both respects. As far as this process is concerned chestnut wood appears to rank between beech and oak in value. When the rapidity of distillation is increased, the greater amount of noncondensable gas secured is offset by the increased cost of the coal and likewise of the distillation products.

The prospects of the match industry in the Indian Empire, with particulars of proposed match-factory sites and woods suitable for match manufacture, R. S. TROUP (*Indian Forest Mem., Econ. Products Ser., 2 (1910), No. 1, pp. III+92+LXXX, figs. 14, map 1*).—A general discussion.

A lecture on the Para rubber tree (Hevea brasiliensis), W. J. GALLAGHER (*Dept. Agr. Fed. Malay States Bul. 10, pp. 27, figs. 10*).—This lecture contains information relative to the physiology and anatomy of the Para rubber tree, together with a discussion of various tapping methods, systems, and tools, and notes on planting distances, thinning out, topping, pruning, resting, and the function of latex.

Propagation of guayule by seeds, J. E. KIRKWOOD (*Amer. Rev. Trop. Agr., 1 (1910), Nos. 2, pp. 34–43, figs. 2; 3–4, pp. 77–84*) —Results are given of experiments conducted by the author under the direction of the Continental Mexican Rubber Company mainly for the purpose of determining the feasibility of propagating the guayule rubber shrub (*Parthenium argentatum*).

The records of germination were kept from day to day. The first of the seedlings appeared in 10 days from the date of the plantings, which were 10 in number, and the germination continued up to 60 days. In all, some 162 seeds, or about 2.9 per cent of the seed sown, germinated. This appears to be the only case on record of an attempt to germinate seeds of the plants of the genus Partheuium.

The results obtained in the germination of guayule seeds were as a whole favorable as to the time required. Although most of the seeds responded quickly a considerable number continued dormant, sometimes for weeks, then

suddenly germinated. No evidence was secured as to the cause of this delayed germination. The germination showed no marked response to variations of temperature within the vital limits, but saturation with water appears to be essential for the best results. The germination of the seed and the growth of the seedling proceed most rapidly when in direct contact with air. Light exerts no appreciable influence. The seeds germinate and grow most rapidly in soils with relatively little water-soluble salts.

On the preparation of German East African plantation rubber, A. ZIMMERMANN (*Pflanzer, 6 (1910), No. 8, pp. 113–118*).—Owing to the low prices received for the average plantation rubber of German East Africa, experiments are being carried on to work out better methods of coagulating the latex and preparing the rubber. Some results are here given of an experiment conducted to produce rubber with a permanent clear color. Thus far Purub, muriatic acid, nitric acid, and oxalic acid used in coagulating the rubber have all given somewhat favorable results in preventing the formation of coloring matter after the rubber has dried. The experiments are to be continued.

On the preparation of rubber (Funtumia elastica), and on its future in the Ivory Coast, A. CHEVALIER (*Agr. Prat. Pays Chauds, 10 (1910), No. 84, pp. 189–201*).—This is a report of a survey of the rubber industry in the various regions of the Ivory Coast, including the details of exploitation, native methods employed in coagulating the rubber, suggestions for improvement thereon, and a discussion relative to the future of rubber in the Ivory Coast.

Lumber saved by using odd lengths (*U. S. Dept. Agr., Forest Serv. Circ. 180, pp. 5*).—In 1909 a number of the leading lumber manufacturers of the Pacific coast put into effect resolutions previously adopted by the National Lumber Manufacturers' Association relative to the manufacture of odd lengths of flooring, ceiling, drop and bevel siding, finish, partition, and molding. This circular embraces the results of an investigation to determine the effect this step might have in saving waste in lumber manufacture.

Under conditions prevailing upon the Pacific Coast, it is estimated that the making of odd lengths will increase the output of the different classes of products by 2.07 per cent. An inquiry in the yellow pine region, covering both short and long leaf yellow pine lumber, suggests that a similar saving can be effected in the South.

Tabular data are given showing the waste due to even-length manufacture, possible saving by trimming to odd lengths, percentage of boards possible to manufacture to odd lengths, and percentage of odd lengths used in various building operations.

DISEASES OF PLANTS.

A brief handbook of the diseases of cultivated plants in Ohio, A. D. SELBY (*Ohio Sta. Bul. 214, pp. 307–456+VII, figs. 105*).—The first section of this bulletin, which is a revision of Bulletin 121 (E. S. R., 13, p. 155), is devoted to a general discussion of plant diseases, parasitic fungi, symbiosis, cultural methods, enzymatic diseases, soil-infesting parasites, soil and seed treatment, wound infection, and remedies for plant diseases, including formulas and methods of application of the standard fungicides.

The second section treats of the diseases of Ohio plants arranged alphabetically according to hosts.

An extended bibliography is appended.

A calendar for plant protection, L. HILTNER (*Pflanzenschutz nach Monaten geordnet. Stuttgart, 1909, pp. VII+433, figs. 138*).—This is a guide to the monthly precautions to be taken to protect economic plants against fungus,

insect, and other injuries and depredations. The principal causes of injury are described at some length. In an appendix the following topics are treated: The causes of injury to cultivated plants, fungicides, insecticides, treatment of fungi and insects by combined applications, spraying apparatus, carbon bisulphid as an insecticide, methods for combating wild mustard by spraying with iron sulphate, seed treatment for combating grain smuts, American gooseberry mildew, field mice, and inoculation of leguminous plants with root-tubercle cultures.

Mycological notes, E. MAYOR (*Bul. Soc. Neuchâtel. Sci. Nat., 36 (1909), pp. 30–36; abs. in Bot. Centbl., 111 (1909), No. 16, p. 407*).—Of the fungi noted the following are of special interest: *Ochropsora sorbi* on *Pyrus communis;* an æcidium on *Sedum reflexum* near plants of *Kœleria cristata* and Valesiaca which were infested with *Puccinia longissima;* an æcidium on *Crepis biennis* near plants of *Carex muricata* infested with a Puccinia; and æcidia on *Cirsium rivulare* near plants of *Carex goodenoughii* infested with Puccinia. Attention is called to the outbreak of *Oïdium quercinum* on *Quercus sessiliflora*, *Q. pedunculata*, and *Q. pubescens*. An oidium was also found on *Fagus sylvatica*. In this connection the author notes the finding in 1899 of an oak oïdium associated with the perithecia of a Microsphæra.

Researches on the life history of parasitic fungi, C. K. BANCROFT (*Ann. Bot. [London], 24 (1910), No. 94, pp. 359–372, pl. 1*).—A study has been made of *Cladosporium herbarum* and a disease caused by Hormodendron to determine the possible relationship existing between these two fungi.

After describing the disease due to Hormodendron and presenting evidence regarding its parasitic nature, the author gives an account of the relationship between the two fungi. He believes that the life cycle is composed of two conidial forms, Hormodendron and Cladosporium. The Hormodendron form is a summer parasitic form, which in the summer produces a disease on the green leaves of a number of species of plants. When the leaves die it passes into the Cladosporium stage.

The Cladosporium is a late form and exists as a saprophyte on dead leaves that have been previously attacked by Hormodendron. It gives rise to Hormodendron if the temperature is moderately high, but at lower temperatures it reproduces itself. In the winter Cladosporium exists in the form of microsclerotia, and on the return of spring these germinate, producing conidia of Cladosporium. The Cladosporium conidia, after germinating, give rise to conidia of Hormodendron, which serve to continue the disease during the summer.

A list is given of various species of fungi which are regarded as synonymous with *C. herbarum*.

A new European species of Peronospora, G. W. WILSON (*Ann. Mycol., 8 (1910), No. 2, pp. 185–187*).—After a brief discussion of the species of Peronospora found on leguminous hosts, the author describes *P. ononidis* n. sp. on the leaves of *Ononis repens* and *O. spinosa* from Germany.

Fusarium nivale, the cause of white mold and its connection with Nectria graminicola, G. IHSSEN (*Centbl. Bakt. [etc.], 2. Abt., 27 (1910), No. 1–3, pp. 48–66, pl. 1, figs. 8*).—The author claims to have proved the identity of *F. nivale* and *N. graminicola* by breeding and infection experiments in which (1) Fusarium diseased oat plants were placed under bell jars and the resulting fructification proved to be the perithecia of *N. graminicola*, (2) healthy plants were infected with either the Fusarium mycelium or conidia and the resulting perithecia identified, and (3) *N. graminicola* perithecia were grown from pure cultures of Fusarium mycelia.

New observations on ergot, R. Stäger (*Centbl. Bakt. [etc.], 2. Abt., 27 (1910), No. 1-3, pp. 67-73*).—After discussing the taxonomic position of a Claviceps on *Poa annua*, the author gives the following new hosts of the genus Claviceps: *Melica ciliata, Deschampsia flexuosa, Sesleria argentea, Festuca nubigena, Ataxia horsfieldii, Calamagrostis javanica*, and *Spartina stricta*. The rôle that insects play in the dissemination of ergot is also discussed.

Fungi as a cause of the lodging of cereal crops, N. Dombrovski (*Khozyaistvo, 1909, pp. 334, 335; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10, 1909, No. 4, p. 558*).—The author shows that the fungus *Ophiobolus graminis* is an important cause of the falling or lodging of cereal crops, and as it attacks the plants most frequently when these are growing in wet places the draining of such soils is recommended as a measure for combating the fungus.

The combating of the stinking smut of wheat, E. Jordi (*Jahresber. Landw. Schule Rütti, 1908-9, pp. 89, 90; abs. in Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 16-17, p. 498*).—In a series of experiments on the control of stinking smut of wheat by seed treatment several immersions of the seed in Bordeaux mixture gave the best results, but this process was found to be too tedious. Next in efficiency came the soaking of the seed for 16 hours in a 0.5 per cent solution of copper sulphate, and third, soaking for 4 hours in a 0.1 per cent formaldehyde solution. Both gave good results, but in each instance the germinating power of the seed was injured.

A bacterial disease of alfalfa, W. G. Sackett (*Colorado Sta. Bul. 158, pp. 3-32, pls. 3*).—The history, distribution, gross characteristics (E. S. R., 22, p. 46), cause, methods of infection, technical descriptions, including the morphological, cultural, physical, and biochemical features of the casual organism (*Pseudomonas medicaginis* n. sp.), and methods of control are given.

The disease is found in 5 counties in Colorado, but is especially destructive throughout the Gypsum Valley in Eagle County, and is also reported from Utah, New Mexico, Nebraska, and Kansas.

The unusual fact that only the first cutting was badly diseased made a satisfactory explanation of the method of infection more difficult, but after a careful investigation of alfalfa fields most subject to the disease the conclusion was reached that freezes and frosts which cause the epidermis on the stems to split open over the first 6 internodes, thereby exposing the succulent moist tissues to infection from germ laden dust blown into these cracks, was the main cause of infection. The later cuttings, not having been subject to such weather conditions, escaped serious infection.

For controlling the blight, the introduction of resistant varieties, especially those which can withstand late spring freezes, is recommended. The clipping of the frosted alfalfa as soon as it is reasonably certain that all danger from frost is past, thus affording an opportunity for an early growth of a new cutting, is also advised.

Stem blight, a new bacterial disease of alfalfa, W. G. Sackett (*Colorado Sta. Bul. 159, pp. 3-15, pl. 1*).—An abbreviated discussion of the preceding bulletin.

Recent investigations on the heart rot of beets, E. Griffon and A. Maublanc (*Bul. Trimest. Soc. Mycol. France, 26 (1910), No. 1, pp. 126-131, pl. 1, fig. 1*).—In a previous publication (E. S. R., 21, p. 642) the authors described the disease commonly known as the heart rot of beets. Attention is called to the presence of Alternaria and Cladosporium with *Phoma tabifica* in connection with the disease, and the authors have made a study of the different fungi to determine whether they might not be phases in the life history of the same

organism, particularly studying the possible relationship of the Cladosporium and the Phoma.

As a result of their investigations, the authors found that *P. tabifica* in their cultures never produced any conidial forms and that the Cladosporium occurring on the young leaves did not result in a Phoma form. This is held to indicate that the two fungi are quite distinct, and it confirms the observations previously made that there are two distinct diseases, one being caused by Cladosporium attacking the young leaves, while the true heart rot is a result of the presence of *P. tabifica.*

The root rot of cassava, E. de Kruijff (*Teysmannia, 21* (*1910*), *No. 3, pp. 147–149*).—For several years cassava plants in Tasmania have suffered from a root rot which causes the plants to shed their leaves and the tubers to rot slowly. In the first stages of the disease the epidermis of the tubers turn a violet red. The tubers then begin to rot at the tips, but often some of the tubers on a diseased plant may remain entirely healthy. The diseased plants do not die, but later in the year form new leaves and tubers.

A microscopic examination of the diseased tissues showed the presence of small bacteria which in pure cultures resembled in many points certain lactic ferment bacteria. Inoculations of healthy plants with the isolated bacteria and also with raw material from diseased tubers were made, but gave only negative results. Old and young plants are alike attacked and irrespective of the weather conditions, for the disease is as severe in wet years as in dry.

Favorable results in checking the disease were obtained by the use of lime on the soil. More resistant varieties from other regions are also suggested as a possible remedy.

Diseases of cotton, C. Maublanc (*Agr. Prat. Pays Chauds, 10* (*1910*), *Nos. 83, pp. 105–111, pl. 1; 85, pp. 295–304*).—An account is given of some of the more important diseases of the cotton plant, among those described being cotton wilt, root rot, damping off, Phoma and Fusarium diseases, angular leaf spot, and boll rot. The data are largely drawn from publications of this Department and of some of the experiment stations in this country.

Tests of spray mixtures for Alternaria blight of ginseng, H. H. Whetzel and W. H. Rankin (*Spec. Crops, n. ser., 9* (*1910*), *No. 93, pp. 327–329, figs. 4*).—Attention is called to the frequent complaint of a failure of Bordeaux mixture to protect ginseng against the Alternaria blight, and an investigation has been conducted to determine the effect of different fungicides on the germination of the spores of the fungus causing the disease. In these experiments about 20 different fungicide mixtures, together with Paris green, sulphur arsenate, and other insecticides were tested.

In comparing the germination results it appears that the fungicides most effective against the Alternaria were full and half strength Bordeaux mixture, Bordeaux mixture and Paris green, Paris green and milk of lime, Paris green alone, milk of lime, sulphur arsenate, and possibly a lime-sulphur mixture applied as a summer spray. The Paris green and milk of lime, alone and in combination, seem to be promising unless for some reason they should prove injurious to the ginseng plant. The effectiveness of the Bordeaux mixture was so complete that the addition of Paris green had no evident advantage.

In conclusion the authors recommend the use of Bordeaux mixture, to which Paris green may be added, and advise against the use of new mixtures which have not been fully tested.

The onion eel worm, W. Laidlaw and C. A. Price (*Jour. Dept. Agr. Victoria, 8* (*1910*), *No. 3, pp. 163–171, figs. 5*).—Descriptions are given of experiments for the eradication of the eel worm (*Tylenchus devastatrix*), which has proved very

destructive to onions in parts of Australia. The experiments consisted of the application of various chemicals to the soil, but while some of them destroyed the living nematodes, they were not efficient in killing the eggs. The treatments were both laborious and expensive and can not be recommended on a large scale.

Where the onions were started from seed in small beds of sterilized soil and transplanted the plants were not attacked by nematodes unless the bulbs were injured in the process of transplanting.

Certain diseases of Maine potatoes and their relation to the seed trade, W. J. Morse (*Maine Sta. Doc. 375, pp. 12*).—On account of the large and rapidly growing demand for Maine seed potatoes for use in the Southern States, the author calls attention to the principal characteristics for the determination from the seed tubers of four important potato diseases (late blight, scab, blackleg, and the Fusarium dry rot of the tuber) which seem to be distributed by infected seed tubers, and suggests precautions and remedies for disinfecting the tubers and preventing the dissemination of these diseases.

It is claimed that diseases capable of being carried by the tubers are no more common in Maine than in other States of similar climatic conditions, and that none is of such a nature but that its transference by this means can be prevented by discarding all unsound or diseased tubers and disinfecting the remainder before planting.

Corky scab of the potato, I. B. P. Evans (*Transvaal Agr. Jour., 8 (1910), No. 31, pp. 462, 463, pl. 1*).—A description is given of the corky scab of the potato, due to *Spongospora scabies*, with suggestions for the prevention of the disease.

Experiments with three tobacco diseases, H. Jensen (*Jaarb. Dept. Landb. Nederland. Indie, 1908, pp. 100–107, pl. 2*).—The inoculation of healthy tobacco roots with a solution of the gum or slime from a plant attacked by gummosis produced this disease in the roots thus inoculated, but if the plants were sound and in a vigorous growing condition the disease rarely spread beyond the original area of infection or to adjacent healthy plants. It is claimed that the best means of control is by keeping the tobacco plants in a vigorous growing condition, as sound, healthy plants were found to be very resistant to this disease. As a result of experiments conducted with Phytophthora it is stated that the spores of this fungus can live for two years in the soil and are capable of infecting tobacco grown on such land during that time. By cultures and microscopic examination the black or leaf spot disease of tobacco was shown to be caused by *Cercospora nicotianæ*.

Root diseases caused by Armillaria mellea in the Puget Sound country, W. H. Lawrence (*Washington Sta. Bul. 3, spec. ser., 1910, pp. 3–16, figs. 5*).—A popular discussion is given of this fungus, its nature, the injuries caused by it, the distribution and means of identifying the disease, and the methods of combating it.

The bitter rot (Glœosporium) of apples, R. Laubert (*Deut. Obstbau Ztg., 1910, No. 14, pp. 175–179, figs. 2*).—A general discussion is given of the characteristics, cause, and methods of control of this disease and of its gradual dissemination throughout Germany.

A canker of apple trees caused by the brown rot fungus, E. S. Salmon (*Gard. Chron., 3. ser., 47 (1910), No. 1221, p. 327, figs. 3*).—Attention is called to the development on the branches of apple trees of cankers caused by the brown rot fungus (*Sclerotinia fructigena*). These cankers may be formed either by the mycelium in a mummified apple, which in drying has become glued to the branch, growing from the diseased apple into the branch, or the mycelium may directly invade the wood from the base of a dead fruit spur which has been killed by the fungus.

The chief danger from these brown rot cankers on the wood consists in the possibility of infection the following spring and summer from the numerous tufts of conidia which project from the cankered areas.

The occurrence of New York apple canker in England, E. S. SALMON (*Gard. Chron., 3. ser., 47 (1910), No. 1217, pp. 258, 259, fig. 1*).—Attention is called to the occurrence of this disease on the branches of a pear tree. The microscopic and macroscopic characters of the fungus (*Sphæropsis malorum*) are figured and described and suggestions given for its control.

Leaf blight of the pear and quince, ETHEL M. DOIDGE (*Transvaal Agr. Jour., 8 (1910), No. 31, pp. 465, 466, pl. 1*).—A description is given of the leaf blight (*Entomosporium maculatum*) which attacks the pear and quince, together with suggestions for its control.

The Panama disease, E. ESSED (*Ann. Bot. [London], 24 (1910), No. 94, pp. 488, 489, figs. 3*).—A preliminary report is given of a fungus disease of the variety of bananas known as Gros Michel. This disease has been noticed in a number of localities in Central America and northern South America, where it has seriously threatened the banana industry.

As a result of a preliminary examination, the author concludes that the disease is due to one of the Ustilagineæ, probably in company with a member of the Chytridious order. The final results of his investigations on this disease are promised in the near future.

The relation of black rot of cacao pods to the canker of cacao trees, J. B. RORER (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 64, p. 38*).—Inoculation experiments with *Phytophthora omnivora* have shown that this organism causes the black rot of the pods as well as the canker of the trees. A bulletin describing both diseases in detail, together with the organism causing them, is in process of preparation.

The root disease of the coconut palm, T. PETCH (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 4 (1910), No. 24, pp. 323-336*).—After a discussion of the root disease of the coconut of various countries, a general description of the symptoms of this disease as it appears in Ceylon and the results of studies as to its cause are given.

The most general symptoms of the root disease of coconuts are as follows: (1) The outer leaves wither and drop, usually remaining for a long time suspended vertically around the stem; (2) the tree becomes barren owing to the suppression of the flowering branches; (3) the new leaves are successively smaller, so that the crown becomes a mere handful of erect yellowish leaves; and (4) finally these small leaves wither and the bud decays.

A twenty-five year old tree in the earlier stages of the disease was dug up and a cross section was cut from the butt. This when examined after 24 hours was found to have developed white tufts of hyphæ from each vascular bundle toward the periphery of the stem. The section was 36 cm. in diameter, and the affected vascular bundles occupied an outer zone from 4 to 6 cm. in width. Both surfaces of the section were similarly affected. On cutting the sections vertically the vessels of the vascular bundles were found to be filled with white hyphæ from one end to the other. The outer vascular bundles, but not the inner, were completely filled with the mycelium of this fungus. Pieces of this section when placed in glass dishes in the laboratory and kept moist for 4 months produced the well known sporophores of *Fomes lucidus*.

The results of these experiments seem to indicate that the true cause of the coconut root disease in Ceylon is the fungus *F. lucidus*, the mycelium of which permeates the outer tissues of the butt end of the tree, especially the vessels of the vascular bundles, gradually filling them and thus shutting off the water

supply, and at the same time cutting off the roots from their food so that they ultimately die.

As to treatment, dead or badly diseased trees should be dug up and the butt of the stem, together with 2 or 3 ft. of the part above the ground, should be burned.

A new disease of citrus fruits, I. B. P. EVANS (*Transvaal Agr. Jour.*, *8* (*1910*), *No. 31*, *pp. 463–465*, *pl. 1*).—A disease of Natal lemons was noticed in 1909 in which the fruit was light in weight and brownish colored. Accompanying the discoloration was a softening and general translucency of the rind, which at the same time became distinctly sticky. At first it was thought that the disease was due to one of the mold fungi, but subsequent observations showed that this could not be true, for instead of becoming soft and moldy the fruit dried up and the brown discoloration became black. Lemons affected by the disease simply dried out, retaining their original shape and form.

A study was made of the cause of the trouble and the organism isolated. This proved to be an undescribed species, to which the name *Diplodia natalensis* n. sp. is given.

All varieties of citrus fruits appear to be readily attacked by this fungus, and in addition apples, apricots, and peaches were destroyed by it if spores were introduced by puncturing the skin.

Observations indicate that the infection of the fruit occurs most commonly at the time of picking, when the fungus gains entrance through injuries.

The influence of the soil on the development of the roncet of the grape, E. PANTANELLI (*Atti. R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat.*, *5. ser.*, *19* (*1910*), *I*, *No. 7*, *pp. 395–401*).—After a careful chemical examination of soils from various localities the conclusion is reached that the roncet has no relationship to the presence or absence of any specific element in the soil, but rather that the physical characters of the soil, such as warmth, porosity, looseness, drainage, etc., play an important rôle. Three groups of factors seem to have an appreciable influence on the appearance of roncet in plants which came originally from healthy layers and scions: (1) The history of the soil both before and after planting, that is, whether it was previously in grapes or other fruit or in grass, etc.; (2) specific properties of the grapes such as depth and extent of the root system, the relation of the rapidity of the growth of the upper parts as compared to the root development, and the specific sensibility to exhaustion of the soil; and (3) position and physical properties of the soil.

Of these three groups of factors the third has a distributive and predispositional action, the second influences only the time and intensity of the attack, while the first group constitutes the main causal factors, of which experience shows that the most important is sensibility to exhaustion of the soil.

Two diseases of gooseberries, F. T. BROOKS and A. W. BARTLETT (*Ann. Mycol.*, *8* (*1910*), *No. 2*, *pp. 167–185*, *pl. 1*; *abs. in Gard. Chron.*, *3. ser.*, *47* (*1910*), *No. 1226*, *p. 428*).—Attention is called to the death of large numbers of gooseberry bushes in Cambridgeshire in which the first indication of trouble is a wilting of the foliage of one or more branches. The attacked branches then die and finally the entire bush. It is claimed that death is due to two distinct fungi, *Botrytis cinerea* and *Cytosporina ribis*.

In the disease caused by *B. cinerea* the external characters of the disease are a wilting and subsequent browning of the leaves on a single branch, usually during the spring and early summer, while bursting through the bark at the base of the attacked branches are innumerable tufts or conidiophores of *B. cinerea* which arise from large black sclerotia located just outside the cylinder of wood tissue. These dead branches easily break off at the point of union with the main stem. When the branch dies others become affected so that finally

in a year or two the entire bush is destroyed. When a branch bearing Botrytis conidiophores is cut transversely a characteristic discoloration of the wood is seen in which the entire wood cylinder with the exception of a narrow peripheral zone of light color is stained a dark gray. Longitudinal sections of the diseased branch show well marked hyphæ of Botrytis, ramifying abundantly in pith, wood, and bast, especially in the vessels and medullary rays. The presence of this fungus in considerable quantities in the vessels checks the transpiration current and thus causes the sudden wilting of the foliage, while its presence in the pith makes its progress either upward or downward easy and rapid. Sclerotia of *B. cinerea* were developed from the diseased wood. The young mycelium of *B. cinerea* when introduced into a slit in a healthy branch produced the characteristic wilting of the foliage, and later the conidiophores of the fungus appeared on the inoculated branches. It is claimed that the fungus probably enters through wounds caused by aphids on the tips of the shoots and travels downward; also that injuries due to spring frosts may permit the entrance of the fungus.

In the disease presumably caused by *C. ribis* the external symptoms are very similar to those of the Botrytis disease, but the wilting usually occurs in the spring just as the young leaves are unfolding, and bushes killed during the winter by this disease have a thin growth of white mycelium on the bark at the base of the dead bush or branch. An old scar or unhealed wound was always found near the base of dead branches or bushes. A cross section of the stem at this point showed a brown discoloration of the wood, except a sector shaped area where its normal light color was unchanged. At the junction between the healthy and diseased wood is a narrow, dark line. The bark also is discolored over a larger area of the stem than the infected wood. The discolored wood extends slightly above and below the wound, and usually both the roots and the upper parts of the stems in recently killed bushes are apparently healthy. Microscopic sections of the discolored wood show that it is permeated in all directions by fine branching fungus hyphæ, noticeably accompanied by a quantity of yellowish brown substance, wound gum, which partially fills up the vessels and occurs plentifully in the wood parenchyma and medullary rays. These hyphæ secrete an enzym capable of dissolving lignin, as they were able to bore through lignin tissues, producing a large amount of delignification. This fungus is a wound parasite, and probably its spread from plant to plant is by means of conidia. Since the fungus can live as a saprophyte in dead wood, all gooseberry bushes killed by this disease should be dug up and burned.

The appearance of the American gooseberry mildew in Belgium, E. MARCHAL (*Ztschr. Pflanzenkrank.*, *20* (*1910*), *No. 4*, *pp. 234, 235*).—Attention is called to a local outbreak of this disease (*Sphærotheca mors uvæ*) on plants which were recently imported from a nursery in Holland. The means taken for its immediate and complete eradication are given, and consist of spraying with a 0.35 per cent solution of lime sulphur and the cutting and burning of badly diseased branches and canes. In August and September two more applications of this same mixture were given, and in October after the leaves had fallen they were again sprayed with a 0.6 per cent solution of the lime-sulphur mixture.

A note on the appearance of two epidemic mildews, B. NAMYSLOWSKI (*Ztschr. Pflanzenkrank.*, *20* (*1910*), *No. 4*, *pp. 236–238*).—The author discusses the appearance of the American gooseberry mildew (*Spærotheca mors uvæ*) in various portions of Russia, and claims that as far as Krakau is concerned the fungus was not introduced on imported berries but is found only on local stock.

The taxonomic position of the oak mildew prevalent in various European countries is discussed.

The mildew of oaks, E. Griffon and A. Maublanc (*Bul. Trimest. Soc. Mycol. France, 26 (1910), No. 1, pp. 132–137, fig. 1*).—A study has been made of the mildew of the oak, in which the authors have sought to determine the relationship of the fungus to other species. As a result of their investigations they have decided that the disease is due to a conidial phase of an unidentified species, and they have given to it the name *Oïdium alphitoides* n. sp.

A fungus disease of the lebbek tree, W. L. Balls (*Cairo Sci. Jour., 4 (1910), No. 41, p. 42*).—The author states that the avenues of lebbek trees in Cairo are suffering through scale insects and other troubles, and that an examination of trees blown down in the spring of 1908 showed that the roots were in many cases damaged by rot, leaving only 1 or 2 sound ones. The rot appeared to have begun at the basal stump and spread into the roots, and the trees examined seemed to have been planted as cuttings, the cut end being left open to attacks of disease-producing organisms. The fungus was unrecognized by the author, but is believed to have been the primary cause of the trouble.

While no remedy is known when the trees are once attacked, it is advised that when planting these trees the cut ends be covered with tar and grafting wax before placing them in the ground.

Notes on the disease of Pterocarpus in Penang, W. Fox (*Agr. Bul. Straits and Fed. Malay States, 9 (1910), No. 4, pp. 133, 134*).—A brief account is given of the occurrence and spread of a disease of *P. indicus* in the Malay Peninsula due to *Polystictus occidentalis*, which has already been noted (E. S. R., 23, p. 354).

On the genetic relation between Coleosporium on Aster scaber and Peridermium pini-densifloræ, Y. Orishimo (*Bot. Mag. [Tokyo], 24 (1910), No. 276, pp. 1–5*).—As a result of inoculation experiments the author is led to believe that the two forms of fungi, *P. pini-densifloræ* occurring on *Pinus densiflora* and *C. sonchi* on *A. scaber*, have been proved to be genetically related, and that the fungus should in the future be known as *C. pini-asteris*.

Leaf disease in Hevea, Mevr. A. E. van Hall-de Jonge (*Dept. Landb. Suriname Bul. 24, pp. 6, pls. 2*).—In 1908 Hevea plants in the nursery of the botanic gardens of Surinam were observed to be attacked by a leaf disease. The leaves showed spots which spread over them in concentric circles. Only the young leaves appeared to be attacked. The cause of the disease is a fungus living on the under side of the leaves, the identity of which is not definitely known. While the disease appears very infectious and spreads rapidly, it is believed to be due to accidental circumstances, especially to too close planting.

Die back of Hevea brasiliensis, T. Petch (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 4 (1910), No. 23, pp. 307–321*).—It is stated that die back is caused by two different fungi. One, *Glœosporium alborubrum*, a true parasite, originates the disease by attacking the leading green shoot in the middle of its length, producing dark brown discolorations which extend upward and downward until the entire shoot becomes diseased and finally dies. The other, *Botryodiplodia elasticæ*, a wound parasite, enters the tree through the dead top shoot after it has been killed by the Glœosporium fungus and causes the chief damage in die back by growing downward in the woody stem and gradually killing it to the ground.

The prompt cutting out of the diseased shoots and a thorough tarring of the wounds are usually efficient remedies for this disease.

The fungus (*B. elastica*) is known to occur in other countries on cacao (stems, roots, and pods), sugar cane, *Albizzia moluccana* (roots), papaw (stems), mango (fruits), and Castilloa (stems), while in Ceylon it grows (1) on *H. brasiliensis*, killing back the main stem, causing the death of stumps, or living

as a saprophyte on dead Hevea stems; (2) on cacao, causing a dry canker on the larger branches or killing back the twigs, or on diseased cacao pods which have been attacked by Phytophthora; (3) on Castilloa, in previously formed wounds on the stem; (4) on dead papaw stems as a saprophyte; (5) on wounds on the stems of old dadaps and on decaying dadap logs; (6) as a saprophyte on stems of *Ficus elastica;* (7) on pruned stems of *A. moluccana*, which it enters through the cut surface and kills down to the base; (8) on tea, which it enters through the roots and gradually kills; and (9) on roots of coconuts killed by the root disease fungus (*Fomes lucidus*).

An extensive defoliation of the older Hevea trees in low country districts is also noted, and is attributed to an abnormal rainfall.

A bark disease of Hevea, tea, etc., T. Petch (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 4 (1909), No. 21, pp. 189–196*).—**A detailed description is given of the gross characteristics, damage, and probable source of infection of the bark disease (*Corticium javanicum*) of Hevea, tea, and other crops in Ceylon.**

On *Hevea brasiliensis* the disease usually originates at a fork of the tree, and appears as a superficial pink incrustation on the bark which gradually spreads until the whole circumference of the tree and the bases of the adjacent branches are covered. Meanwhile, the hyphæ from the older parts of the superficial area penetrate into the bark and gradually kill it. This dead bark splits and finally peels away from the wood. The spread of the fungus is governed largely by the moisture conditions, while the amount of damage done before the disease is noticed depends upon the size of the trees. Young two-year-old stems are quickly encircled and ringed, while the older trees are not so readily damaged.

On six-year-old Hevea in the wetter rubber districts the fungus grows continuously and kills off the bark uniformly, while the side branches at the point of attack are ringed and killed and the bark on the main stem peels off in large patches. The disease usually appears toward the close of the southwest mon soon rains, and is conveyed from tree to tree by wind-blown spores which are produced in large numbers on the surface of the pink incrustations. One and two-year-old trees when attacked should be cut back below the point of infection. In older trees the diseased area may be cut out and the wounds tarred.

On tea the growth of the pink fungus on the smaller twigs is the first sign of the disease. From these it spreads down to the thicker branches, which soon lose their leaves and die back either over the whole bush or on only one side. In many cases the fungus grows along only one side of a branch, usually the under side. In such cases the bark is killed only where the fungus grows, and the subsequent ingrowth of living bark produces a canker in which the dead bark is not shed, but remains ragged and fibrous on the younger twigs, or smooth and blackened internally on the larger branches.

The more important fungus diseases of deciduous trees, G. Kock (*Sep. from Landes Amtsbl. Erzherzogt. Österr. unter der Enns, 1909, No. 4–5, pp. 36, figs. 6*).—**Descriptions are given and methods suggested for the control of some of the more important diseases of maple, locust, birch, beech, alder, ash, linden, poplar, sycamore, plane tree, horse chestnut, elm, and willow.**

Arsenical poisoning of fruit trees, W. P. Headden (*Colorado Sta. Bul. 157, pp. 3–56, figs. 8*).—**Further investigations on the arsenical poisoning of fruit trees by the use of insecticides containing certain forms of arsenic (E. S. R., 20, p. 452) are reported.**

Three forms of this trouble are recognized, viz, corrosive arsenical, systematic arsenical, and arsenic-lime poisoning. The trouble is said to be very general throughout the State, and occurs in all kinds of soils, which fact is thought to eliminate the question of seepage and, to a large extent, that of alkalis.

The conclusions reached are practically the same as heretofore reported.

Injury to foliage by Bordeaux mixture, E. S. SALMON (*Jour. Bd. Agr. [London], 17 (1910), No. 2, pp. 103–113*).—The author discusses the injuries often caused by the use of Bordeaux mixture on the foliage and fruit of apples, peaches, and other fruits, and suggests the probable causes of these injuries and precautions that may prove effective in reducing the damage.

The injuries from the use of Bordeaux mixture on apple leaves may take one of three forms: (1) Brown spots which soon fall out, giving the leaf a "shot-hole" appearance, or, if on the edges, a jagged appearance; (2) a scorching of the edges or tips of the leaves; or (3) a yellowing or browning of the entire leaf, which subsequently falls. On the fruit the injury may take the form of russeting, or splotches may appear on the young apples, or, in severe cases, the apples may crack.

The russeting of the fruit was found to be most frequent where the spraying was done 10 to 14 days after the fruit was set. Some varieties of apples seem to be more susceptible to Bordeaux mixture injury than others, while the higher the pressure of the spray stream the greater the injury. The following precautions are suggested: (1) Use a nozzle which throws a fine misty spray, and quit spraying before the trees begin to drip; (2) give varieties of apples that are susceptible to Bordeaux mixture injuries a very slight spraying with Bordeaux mixture 3:3:50 or substitute a lime-sulphur spray; (3) spray immediately after the blossoms fall, and again if necessary when the apples are about three fourths grown; and (4) use freshly prepared Bordeaux mixture made from the best lump quicklime.

Lime-sulphur mixtures and their influence on copper sprays, TETZNER (*Deut. Obstbau Ztg., 1910, No. 14, pp. 179, 180*).—This is a brief discussion of the value of lime-sulphur sprays, both as insecticides and fungicides, and of their probable use in place of Bordeaux mixture in certain cases where the latter is known to injure the foliage of the sprayed plants.

Effect of alkaline polysulphids on spraying apparatus, L. HUGOUNENQ (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 21, pp. 629, 630*).—Attention is called to the frequent complaints that the use of alkaline polysulphids as fungicides is followed by injury to the spraying apparatus. Various methods have been suggested, such as tinning the interior of all spraying apparatus, but the author states that thoroughly rinsing the spray pump with clear water after use is all that is necessary for its protection.

A horseback sprayer for fruit growers, J. HÖNINGS (*Deut. Obstbau Ztg., 1910, No. 14, pp. 173–175, figs. 2*).—A description is given of a spraying outfit suitable for closely planted fruit trees, berries, or other crops where a wagon can not readily be used, and which is designed to be carried on the back of a horse while the spray is being applied.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Directory of officials and organizations concerned with the protection of birds and game, 1910, T. S. PALMER (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 74, pp. 16*).—This, the eleventh annual directory of officials and organizations concerned with the protection of birds and game in the United States and Canada, has been arranged on the same plan as the directories issued each year since 1900, and has been revised to July 15, 1910. The addresses are grouped under 4 headings: State officials, national organizations, state organizations, and Audubon societies.

Regulations for the protection of game in Alaska (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 75, pp. 2*).—The 4 regulations here promulgated relate to the killing and sale of deer and the killing of walrus.

Game and fish laws of the State of Louisiana (*New Orleans, 1909, pp. 48*).—The laws relating to game and fish have been brought together and indexed.

The mammals of Colorado, E. R. WARREN (*New York and London, 1910, pp. XXXIV+300, pl. 1, figs. 81, maps 3*).—An account of the several species found within the State, together with a record of their habits and distribution.

Breeding minks in Louisiana for their fur.—A profitable industry, W. A. ELFER (*New Orleans, 1909, pp. 64, pls. 14*).—A small guide.

The extermination of rats in rice fields, W. J. GALLAGHER (*Dept. Agr. Fed. Malay States Bul. 5, pp. 9*)—Carbon bisulphid is said to be the cheapest and most effective remedy for rats in rice fields.

Birds of California in relation to the fruit industry, II, F. E. L. BEAL (*U. S. Dept. Agr., Bur. Biol. Survey Bul. 34, pp. 96, pls. 6*).—In this part, which completes the investigations made of the economic status of birds in California (E. S. R., 19, p. 552), the author deals with the California quail, horned lark, and members of the woodpecker, flycatcher, jay, blackbird, and sparrow families. As in the first part, stress is laid upon the nature of the food of each species for the entire year.

The studies show that most of the species are beneficial and that without their aid the difficulty and expense of raising fruit would be greatly increased; still a few species under certain circumstances are harmful and need to be held in check.

Bird guide, C. A. REED (*New York, 1909, pts. 1, pp. 254, pls. 2, figs. 240; 2, pp. 229, pl. 1, figs. 195*).—Part 1 of this pocket guide is devoted to water birds, game birds, and birds of prey east of the Rocky Mountains; part 2, to the land birds east of the Rockies, from parrots to bluebirds.

The birds of Guiana, F. P. and A. P. PENARD (*De Vogels Van Guyana. Paramaribo [1908], pp. XLIII+587, figs. 165*)—This work is devoted to the birds of Surinam, Cayenne, and Demerara

Index-catalogue of medical and veterinary zoology. C. W. STILES and A. HASSALL (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 39, pts. 28, pp. 2169–2250; 29, pp. 2251–2326; 30, pp. 2327–2386; 31, pp. 2387–2442*).—These parts list the names of authors Sim to von Stenitzer, Stenroos to Szymánski, T to Thon, and Thooris to Utz, respectively.

The insect book, W. P. WESTELL (*New York [1908], pp. XII+120, pls. 19*).—A brochure treating the subject in a popular way.

A handbook of practical parasitology, M. BRAUN and M. LÜHE, trans. by LINDA FORSTER (*London, 1910, pp. VIII+208, figs. 100*).—A translation of the work previously noted (E. S. R., 23, p. 163).

Experiments on the generation of insects, F. REDI (*Chicago, 1909, pp. 160, pls. 30, figs. 12; rev. in Nature [London], 83 (1910), No. 2112, pp. 215, 216*).—This is a translation of the Italian edition of 1688 of a work that did much to refute the old doctrine of spontaneous generation.

First annual report of the Arizona Horticultural Commission (*Ariz. Hort. Com. Ann. Rpt., 1 (1909), pp. 11*).—The text of the law relating to inspection of imported nursery stock, etc., is given in this report. The commission is empowered (1) to inspect orchards, nurseries, and nursery stock for insect pests, and to require their eradication when found; and (2) to inspect incoming shipments of nursery stock and quarantine against dangerous sources of supply.

[Circulars of the Arizona Horticultural Commission] (*Ariz. Hort. Com. Circs. 1, pp. 4; 2, p. 1; 3, p. 1; 4, pp. 2; 5, pp. 2; 6, p. 1; 7, p. 1; 8, p. 1; 9, p. 1; 10, p. 1; 11, pp. 2; 12, pp. 2; 13, pp. 2; 14, pp. 3*).—These circulars bear the following titles: No. 1, Extracts from Horticultural Inspection Law; Nos. 2–13, articles by A. W. Morrill on Arizona Citrus Pests and the Importance of the Horticultural Law, Influence of Climatic Conditions upon Insects, Citrus Pests in Florida and California, The Control of Citrus Pests, Mites or So-called Spiders Affecting Citrus, Mealy Bugs Affecting Citrus, The Long and the Purple Scales in Florida and California, Is Arizona Immune to Purple Scale, California Red and Yellow Scales, The Black Scale, Some Citrus Scale Pests of Minor Importance, and The White Fly Enemies of Citrus; and No. 14, Regulations Concerning the Importation of Nursery Stocks and Other Plants into Arizona.

Insects [in Nova Scotia], H. W. Smith (*Ann. Rpt. Sec. Agr. Nova Scotia, 1909, pt. 1, pp. 26–34*).—The occurrence of injurious insects in Nova Scotia in 1909 is briefly noted.

Cooperative laboratory for the study of sugar cane insects, D. L. Van Dine (*La. Planter, 44 (1910), No. 20, pp. 420–422*).—Following a brief historical review, the investigations now being conducted by the Bureau of Entomology of this Department in cooperation with the Louisiana stations are considered and the more important sugar cane pests, namely, the sugar cane borer, sugar cane beetle, sugar cane mealy bug (*Pseudococcus calceolariæ*), and the Argentine ant discussed.

It is believed that systematic inspection and the treatment of infested cuttings will remove the danger of introducing dangerous cane insects from one locality to another or from abroad. Experiments are now being made to determine the effect of various treatments on the germination of seed cane, particularly as relating to the mealy-bug. There is thought to be a direct relation between insect injury and the prevalence of fungus diseases of sugar cane.

Apple tree insects of Maine, Edith M. Patch and O. A. Johannsen (*Maine Sta. Doc. 383, pp. 68, pls. 4, figs. 35*).—Brief accounts are given of the more important insects attacking the apple in Maine and of the remedial measures applicable.

Grasshoppers and their control, L. M. Geismar (*Michigan Sta. Spec. Bul. 53, pp. 5–7*).—Considerable damage to grass and oats by grasshoppers was reported during the seasons of 1908 and 1909 in those portions of the Upper Peninsula where soils of a sandy nature predominate. Fall plowing sandy soils wherever it is possible offers an excellent remedy by burying the egg pods, thus preventing them from hatching, by breaking open some, so that moisture can get in, and by leaving still others near the surface where birds or shrews can get them. The Criddle mixture which is made of horse droppings, salt, and Paris green has been tested and found to be the cheapest method for the wholesale destruction of grasshoppers. Results of tests made in 1909 indicate that practically all damage to crops can be avoided by applying this mixture early in June while the grasshoppers are still quite small.

Third annual report of the committee of control of the South African Central Locust Bureau, C. P. Lounsbury (*Ann. Rpt. Com. Control So. African Cent. Locust Bur., 3 (1909), pp. 68*).—The conditions relative to migratory locusts in South Africa which existed during the locust season of 1908–9 are discussed. Locust birds, the most important of the checks on South African migratory locusts, were particularly abundant, the leading species being the so-called large (storks) and small (pratincoles) locusts birds, none of which breed in South Africa.

Reports of the several administrations were presented for Cape Colony by C. P. Lounsbury, Natal by A. Kelly, Transvaal by F. Thomsen, Orange River Colony by C. P. Van Der Merwe, southern Rhodesia by W. Honey, Basutoland by C. E. Boyes, Bechuanaland Protectorate by M. Williams, R. J. Davys, and B. May, Swaziland by W. Steward, Mozambique by C. W. Howard, and for German Southwest Africa. The proceedings of the third annual meeting of the committee of control, held at Cape Town in May, 1909, are also given.

An orthopterological reconnoissance of the southwestern United States. Part III: California and Nevada, J. A. G. REHN and M. HEBARD (*Proc. Acad. Nat. Sci. Phila., 61 (1909), pt. 3, pp. 409–483*).—This is the final part of the series, previously noted (E. S. R., 21, p. 555). Of the 110 species treated 6 species and 2 subspecies are new.

Thysanoptera of southern California, II, D. L. CRAWFORD (*Pomona Jour. Ent., 2 (1910), No. 1, pp. 149–152, fig. 1*).—Notes are given on *Euthrips minutus*, *Phyllothrips fasciculata*, and *Anaphothrips longipennis*. The last-named of these, taken from olive foliage infested with the black scale and also upon pine foliage, at Claremont, Cal., is described as new.,

Thysanoptera of Mexico and the South, II, D. L. CRAWFORD (*Pomona Jour. Ent., 2 (1910), No. 1, pp. 153–170, figs. 8*).—In this paper, continuing previous work (E. S. R., 23, p. 255), additional new species from the South, including Mexico, Central and South America, and Cuba, are described and figured. One species and variety of Euthrips, 2 species and a variety of Liothrips, and one species each of Dictyothrips, Thrips, Phlœothrips, Anthothrips, and Idolothrips are described as new.

Notes on two West African Hemiptera injurious to cocoa, G. C. DUDGEON (*Bul. Ent. Research, 1 (1910), No. 1, pp. 59–61, pl. 1*).—Notes on injury by the cocoa Helopeltis from the Gold Coast and by the cocoa bark sapper (*Sahlbergella theobroma*) are presented.

The curly-top of beets, H. B. SHAW (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 181, pp. 46, pls. 9, figs. 9*).—This is a progress report of investigations conducted to determine the cause and remedial measures for curly-top of sugar beets, which occurs in the intermountain region of the West, particularly in Colorado and Utah, as previously noted (E. S. R., 19, p. 1151; 20, p. 954).

From cage experiments conducted in which leafhoppers (*Eutettix tenella*), thrips, and red spiders were used, it is concluded that the beet leafhopper is the primary cause of the trouble. It is said that no outbreaks are known to have occurred outside the native habitat of this insect, namely, the Southwestern States, and generally in the vicinity of what is known as the "sagebrush country." In the experiments the first unmistakable signs of curly-top were noted within 13 days after the introduction of leafhoppers.

"One leafhopper is capable of initiating the disturbances in a young beet, and the effect of numerous hoppers on seedlings may be so severe as to kill them in a few days, before the visible symptoms have had time to develop. The younger the beet the more sensitive is it to leafhopper work. The nymphs of *E. tenella* produce the symptoms of curly-top much more rapidly than do the adult insects."

"While there is still some doubt as to the original host plants of *E. tenella*, it is rather probable that the principal ones are greasewood (*Sarcobatus* sp.), sea blite (*Dondea* sp.), *Atriplex* sp., and Russian thistle. The writer has found the insect on *Sarcobatus* sp. and *Atriplex* sp."

"No other insect and no other species of leafhopper is known to induce the disease herein described."

"Two distinct types of curl are manifested in this disease—the inward and the outward, or retracted. . . . The disease can not be due to loss of plant juices extracted by leafhoppers, but rather to the introduction by those insects of an active agent. Few or no beets that develop curly-top symptoms ever recover. Beets may fail to show symptoms of curly-top to the end of the season if attacked by leafhoppers after they have attained considerable size and vigor. Yet the trouble is initiated and transmitted to the root, only to develop with full virulence in the first shoots the following spring if they be planted out for seed production. . . . It is useless to make selections for seed from fields badly affected with curly-top. The inward type of curl is generally produced on young beets. The retracted type appears on seed beets and on sugar beets that had attained considerable size and vigor before the symptoms developed. Until recently curly-top symptoms had been noted on no other plants than beets, but the writer noted the symptoms on cabbage in 1909."

"It is considered advisable to plant as early as practicable after danger of late frosts is over, even to take some risks of late frost, in order to get the beets well established and vigorous before leafhoppers are likely to be numerous."

A bibliography is appended.

A new gall-making psyllid on hackberry, T. D. A. Cockerell (*Ent. News, 21 (1910), No. 4, pp. 180, 181*).—*Pachypsylla rohweri*, which forms galls on the underside of leaves of *Celtis reticulata* at Boulder, Colo., is described as new.

Papers on cereal and forage insects. Contributions to a knowledge of the corn root-aphis, R. A. Vickery (*U. S. Dept. Agr., Bur. Ent. Bul. 85, pt. 6, pp. 97–118, pl. 1, figs. 6*).—The results of recent studies of the corn root-aphis, particularly in the Southern States, are presented in this paper.

Experiments show that if the apterous females of *Aphis maidi-radicis* are transferred to the roots of corn or cotton from several of their wild food plants, or if they are transferred from corn to cotton, they will produce young and establish colonies. In order to determine the preference of this louse for cultivated food plants, seeds of a number of species were planted near infested corn rows, trusting to the ants to transfer the aphids from one plant to another. When examined on June 5, muskmelon and watermelon plants and sweet corn were found to be quite generally infested, while turnips, cowpeas, beans, and radish had but few lice upon them. The ants found in attendance were *Lasius niger americanus*, *Pheidole dentata comutata*, and *P. vinelandica*. The cultivated food plants of this aphis are discussed at some length. The species has been particularly injurious to corn in Maryland, Ohio, Indiana, and Illinois and has done serious injury to this crop in eastern Pennsylvania, New Jersey, the Virginias, and the Carolinas. Its seasonal history in other parts of the country does not appear to vary materially from that in Illinois as described by Davis (E. S. R., 20, p. 1051). Injury by a form of this species to cotton, asters, and other cultivated food plants is also briefly discussed.

Preventive measures include crop rotation, maintenance of soil fertility, early plowing, followed by frequent cultivations, and the use of repellents.

The paper concludes with a discussion of the Erigeron root-aphis (*A. middletoni*), which has usually been identified with *A. maidi-radicis*. "So far as is now known *A. middletoni* infests normally plants of the genera Aster and Erigeron, usually in very large colonies at the crown of the plant just below the surface of the ground or on the large roots. The only cultivated plants it has been known to attack are *Cosmos bipinnatus* and the China or German asters (*Callistephus hortensis*), and possibly also dahlias and French artichoke (*Cynara scolymus*)." Its food plants, attendant ants and experi-

ments conducted to determine its adaptability to other food plants are discussed. The experiments indicate that under natural conditions in the field this aphis will not change from the Erigeron to corn.

A list of the genera described as new from 1758 to 1909 in the family Aphididæ, H. F. WILSON (*Ent. News, 21 (1910), No. 4, pp. 147–156*).—One hundred and eighty-two genera are listed.

Notes on the two papers on Aphididæ by Rafinesque, H. F. WILSON (*Proc. Ent. Soc. Wash., 12 (1910), No. 1, pp. 27–30*).—During the summer of 1909 an attempt was made to locate some of Rafinesque's species by collecting specimens from the plants named by Rafinesque and comparing them with his descriptions. In this way the identity of several species was determined.

The natural enemies of the citrus mealy bug, I. E. O. ESSIG (*Pomona Jour. Ent., 2 (1910), No. 1, pp. 143–146, figs. 3*).—The brown lace-wing (*Sympherobius angustus*) is considered in this paper.

Mealy bug and fumigation, C. F. BAKER ET AL. (*Claremont Pomol. Club Bul. 1, pp. 23, figs. 4*).—The citrus mealy bug is here discussed by a number of authors.

The white fly, C. E. HOOD (*Massachusetts Sta. Circ. 19, pp. 2*).—A brief account of the greenhouse white fly and the remedial measures applicable.

The purple and red scales, C. C. CHAPMAN ET AL. (*Claremont Pomol. Club Bul. 2, pp. 14, figs. 7*).—Brief accounts of these scales by several authors.

On scale insects (Coccidæ), etc., from the Uganda Protectorate, R. NEWSTEAD (*Bul. Ent. Research, 1 (1910), No. 1, pp. 63–69, figs. 2*).—Six species are noted, of which *Stictococcus dimorphus* from German East Africa and from cacao pods in Uganda is described as new to science. *Ceroplastes ceriferus*, which attacks coffee, cacao, agave, canna, croton, hibiscus, and other crops, is said to occur in sufficiently large quantities to be of economic importance.

Observations on the life history of Trypanosoma lewisi in the rat louse (Hæmatopinus spinulosus), A. BREINL and E. HINDLE (*Ann. Trop. Med. and Par., 3 (1910), No. 5, pp. 553–564, pls. 2*).—A report of experiments which have extended over a period of more than a year concerning the mode of transmission of *Trypanosoma lewisi* by means of the rat louse (*H. spinulosus*).

On the etiology of tabardillo or Mexican typhus.—An experimental investigation, J. F. ANDERSON and J. GOLDBERGER (*Jour. Med. Research, 22 (1910), No. 3, pp. 469–481*).—Body lice (*Pediculus vestimenti*) kept during the day at a temperature of from 24 to 27° C. lived but a comparatively short time, while in those kept at a temperature of 14 to 20° the mortality was relatively slight. "This influence of temperature on the longevity of the louse seems to us strikingly significant; it explains the rarity if not absolute nonexistence of this insect in the tropical coastal strip of Mexico, where tabardillo never occurs except as isolated imported cases; it makes understandable the singular limitation of the disease to the temperate climate of the central plateau; and it is in harmony with the seasonal prevalence and geographic distribution of the disease."

Further investigations regarding the etiology of tabardillo, Mexican typhus fever, H. T. RICKETTS and R. M. WILDER (*Jour. Amer. Med. Assoc., 55 (1910), No. 4, pp. 309–311*).—This paper reports results obtained since one previously noted was prepared (E. S. R., 23, p. 57).

The progeny of body lice that had been reared to maturity on infected patients were placed on a normal macacus monkey on April 28, but its temperature could not be taken following the application. Although found on May 26 to be in good health it proved resistant to a subsequent immunity test. Several bedbugs infected through repeated feedings on typhus patients failed to trans-

mit the disease to a macacus monkey. The bites of fleas infected in a similar manner, emulsified in physiologic salt solution and rubbed into scarifications of the abdominal skin of normal monkeys, also failed to produce the disease.

The larva of Eumæus atala, J. L. HEALY (*Ent. News, 21 (1910), No. 4, pp. 179, 180*).—The larva of this butterfly was found to feed on a species of fern growing in the vicinity of Miami, Fla.

On the resistance of gipsy moth eggs (Liparis dispar) to cold and other conditions, W. REIFF (*Psyche, 17 (1910), No. 2, pp. 69–72*).—The author reports experiments in which gipsy moth eggs were exposed during the winter of 1908–9 to a temperature of −21.5° C. These appear to show that the eggs from which the woolly covering had been removed can withstand quite severe cold without injury, provided that this temperature does not endure too long. Even depilated eggs withstood snow and water, as well as low temperature, without damage. Thus it appears that gipsy moth eggs which have been removed from their normal location through some accident and have fallen singly to the ground can easily withstand the winter even without their protective covering. Simply tearing off the eggs from their attachment, which is occasionally done in private yards and similar places, has absolutely no effect in killing the eggs.

Reference is made to a paper by A. Bau, of Germany, who finds the eggs of several species of Bombycid moths, including *Malacosoma neustria* and *Psilura monacha*, when eaten, to pass through the bird (jay) undigested, protected by means of their extremely hard chitinous shells, and remain in a living state. The author believes that as the eggs of the gipsy moth have very strong shells they, too, are resistant to the decomposing action of the digestive juices of birds' stomachs. It is thought that the sporadic diffusion of the gipsy moth in Massachusetts hitherto unexplained may have taken place in this way.

Notes on Hemileuca lucina, W. REIFF (*Psyche, 17 (1910), No. 1, pp. 29–32, fig. 1*).—The occurrence of large numbers of caterpillars of this species on meadow-sweet (*Spiræa salicifolia*) in a meadow at Raymond, N. H., is reported upon.

On the pathology of jaundice of the silkworm, C. SASAKI (*Jour. Col. Agr. Imp. Univ. Tokyo, 2 (1910), No. 2, pp. 105–161, pls. 6*).—This disease is said to prevail in all countries where silkworms are bred. It is frequently met with in Japan, being of annual occurrence. According to the author, the true or primary causes of the disease are not simple but multifold, but the results of the disease are in all cases the production of polyhedral bodies as a secondary effect.

On the parasites of two species of West African wild silkworms, G. C. DUDGEON (*Bul. Ent. Research, 1 (1910), No. 1, pp. 83, 84, fig. 1*).—The cocoons of *Anaphe infracta* and *A. moloneyi*, the silk from which is utilized in Nigeria for the manufacture of yarns used in embroidery, are said to be largely parasitized by at least one species of Ichneumonidæ, two of Phycitinæ, and a tachinid fly.

The macrolepidoptera of the Bermudas, F. M. JONES (*Ent. News, 21 (1910), No. 4, pp. 165–168*).—A report of collections made between December 7, 1908, and May 20, 1909.

Further study of the Catocalæ, R. R. ROWLEY and L. BERRY (*Ent. News, 21 (1910), No. 3, pp. 104–116*).—Life history notes on several native and exotic species are presented.

New species of Tineina from California, ANNETTE F. BRAUN (*Ent. News, 21 (1910), No. 4, pp. 171–179*).—Among the new species from California here described are *Nepticula ceanothi*, bred from upper side mines on leaves of *Ceanothus divaricatus*, collected in Placer County; *N. variella*, bred from winding mines on the upper side of *Quercus agrifolia* in Alameda County; *N. punctulata*,

bred from upper side mines on leaves of *C. cuneatus* in Placer County; *Bucculatrix transversata*, bred from leaves of *Ambrosia psylostachya* in Los Angeles County; *Gracilaria reticulata*, the larva of which rolls under the apex of leaves of *Q. agrifolia* in Mills College; and *G. palustriella*, bred from mines on leaves of a species of Salix in Mills College.

The life history of Cricula trifenestra, J. H. STEBBINS, Jr. (*Ent. News, 21 (1910), No. 3, pp. 101–103*).—This species, bred from eggs received from India, was found to be double brooded.

The larva and food-plant of Glyptocera consobrinella, H. G. DYAR (*Proc. Ent. Soc. Wash., 12 (1910), No. 1, p. 52*).—The larvæ of this phycitine were found upon the leaves of *Viburnum lentago* at Lincolnville, Me., in August. They spun up in September and the adults issued the following spring. The larvæ eat the whole leaf, often webbing to the stem and cutting the midrib.

Two new species of Lætilia, H. G. DYAR (*Proc. Ent. Soc. Wash., 12 (1910), No. 1, p. 54*).—*Lætilia myersella* and *L. cremiella*, the first named bred from scale insects collected from pine at Rockville, Pa., and also at Tryon, N. C., are described as new.

Schizomyia ipomoeæ, E. P. FELT (*Ent. News, 21 (1910), No. 4, pp. 160, 161*).—This species was reared in large numbers at St. Vincent, British West Indies, from the flower buds of Ipomœa.

[Notes on mosquitoes], S. T. DARLING (*Jour. Trop. Med. and Hyg., 13 (1910), No. 1, p. 12*).—The author finds that with the species with which he has worked (*Anopheles albimanus*, *A. pseudopunctipennis*, and *Stegomyia calopus*) the desire to suck blood is not dependent upon the presence in the spermathecæ of the female of the spermatozoa of the male. Females, isolated as they emerged, would, after 24 hours, puncture and suck blood as greedily as fecundated ones. "Specimens of *A. pseudopunctipennis* did not bite with alacrity; but this mosquito, I have found, does not visit quarters to the same extent that *A. albimanus* does, and in my infecting experiments only 12 per cent of *A. pseudopunctipennis* became infected after biting favorable cases of malarial fever, while 60 per cent of *A. albimanus* became infected. This might be interpreted as meaning that blood sucking is not a confirmed habit with *A. pseudopunctipennis*. . . .

"Males have lived for 15 to 19 days, frequently outliving females when both were subjected to a raisin or date diet, the females not being permitted a blood feeding. When the male has suitable food he appears to live in captivity fully as long as females do. This is based on observations with *A. pseudopunctipennis*, *A. albimanus*, *Culex cubensis*, and *S. calopus*."

Notes on the mosquitoes of Arkansas, J. K. THIBAULT, Jr. (*Proc. Ent. Soc. Wash., 12 (1910), No. 1, pp. 13–26*).—This account includes an annotated list of mosquitoes of Arkansas in which observations made during four seasons (1906–1909) are reported.

A preliminary note on the prevalence of mosquitoes in Cairo and its environs, F. C. WILLCOCKS (*Ann. Trop. Med. and Par., 3 (1910), No. 5, pp. 583–589*).—Notes on the occurrence and habits of a number of species.

The genus Tachydromia, A. L. MELANDER (*Psyche, 17 (1910), No. 2, pp. 41–62, pl. 1*).—A table of the genera and subgenera of the Tachydromiinæ, also one for the separation of the North American species of the genus Tachydromia, descriptions of which follow, are here presented. Six new forms are described. A catalogue of the 33 described species of the genus is included.

The effect of mosquito larvæ upon drinking water, R. BOYCE and F. C. LEWIS (*Ann. Trop. Med. and Par., 3 (1910), No. 5, pp. 591–594*).—The experiments here reported consisted in placing larvæ of *Culex* spp. and of *Theobaldia annulata* in a flask of nonsterilized drinking water, and comparing from day

to day the number of bacteria present in the water with the number present in a control flask to which no larvæ had been added. The experiments show that the presence of the larvæ in drinking water adds very considerably to the number of bacteria present.

A new genus and two new species of African fruit flies, E. E. AUSTEN (*Bul. Ent. Research, 1 (1910), No. 1, pp. 71–77, figs. 2*).—*Musca vittata* of Fabricius is the type species of the new genus Carpophthoromyia here erected. Two new species belonging to this genus, which were received from Uganda, are described as *C. pulchella* and *C. formosula*.

Glossina palpalis.—A résumé (*Sleeping Sickness Bur. [London] Bul. 14, pp. 45–53*).—This is a summary of observations on *G. palpalis* which have been made since the account previously noted (E. S. R., 21, p. 255) was prepared.

Observations on the life history of Glossina palpalis carried out in the Sleeping Sickness Laboratory at Entebbe, Uganda, E. DEGEN (*Sleeping Sickness Bur. [London] Bul. 12, pp. 471–475, chart 1*).—Further information on the bionomics of this tsetse fly is given.

Studies of the diptera with internal entomophagous larvæ.—I. Parasitic characteristics from the biological, ethological and histological points of view, J. PANTEL (*Cellule, 26 (1910), pp. 27–216, pls. 6, figs. 26*).—Chapter one of this work (pp. 29–104) is devoted to an account of the anatomical and biological characteristics as related to the taking possession of the host, chapter 2 (pp. 104–128) to the parasitic life within the host, chapter 3 (pp. 129–160) to the direct injuries by the parasite and defensive reactions of the host, and chapter 4 (pp. 160–178) to other ethological and biological questions relating to parasitism. Following a résumé and conclusions, a glossary is given of some of the terms employed and a bibliography of the more important literature relating to the subject.

A revision of the species of Agathomyia of the eastern United States, C. W. JOHNSON (*Psyche, 17 (1910), No. 1, pp. 7, 8*).—An annotated list with a table for the separation of 5 species of platypezids of this genus.

A new species of Cordylobia, a genus of African diptera (family Tachinidæ, subfamily Calliphorinæ), the larvæ of which are subcutaneous parasites in man and other mammals, E. E. AUSTEN (*Bul. Ent. Research, 1 (1910), No. 1, pp. 79–81, fig. 1*).—This new species (*Cordylobia prægrandis*) is described from material collected in Cape Colony, Natal, and Rhodesia.

Some new facts on the bionomics of the California rodent fleas, M. B. MITZMAIN (*Ann. Ent. Soc. Amer., 3 (1910), No. 1, pp. 61–82*).—During the campaign that has been conducted against bubonic plague in California the author has studied the parasites associated with the transmission of disease among rodents. The bionomics of rodent fleas in general are here considered, particular attention being given to the squirrel flea (*Ceratophyllus acutus*).

The author has found that the breeding of fleas under laboratory conditions can be carried on quite satisfactorily when there is furnished a medium simulating the nest of the host. "Fleas reared from the cocoon kept without a host have never been observed to copulate or oviposit. The eggs are never laid on the host. Oviposition takes places within 36 hours after the female is removed from the host. . . . The larvæ can live on the bloody egg pellicles and the dejecta of the parent for a period of 5 to 6 days. . . . The California rodent fleas have a greater life in all stages than fleas of the eastern United States and India." The average length of the stages of development in *C. acutus* are for the egg state, 8 days; larval stage, 28 days; cocoon, 31 days; longevity of the adult, while waiting for a host, 32 days and longer. "Fleas which have never been fed from the time of emergence from the cocoon prove longer lived when starved than fleas removed from the host. Rat fleas may

be kept alive on a human host for a considerable time, one specimen being kept alive as long as 5 months. . . . Induced parasitism of rodent fleas on man seems to be influenced by the length of mouth parts in the different species. One specimen of *C. acutus*, the species with the longest rostrum, fed for a period of nearly one hour at one insertion of the mouth. It is indicated that starvation of infected fleas, when these insects are transported in clothing, may not eliminate the danger of transmission of plague."

General observations on the bionomics of the rodent and human fleas, M. B. MITZMAIN (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Bul. 38, pp. 34*).—Much of the data here presented are included in the account above noted.

A note on squirrel fleas as plague carriers, G. W. MCCOY (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 25 (1910), No. 15, p. 465*).—In the experiments reported *Ceratophyllus acutus*, the common squirrel flea of California, transmitted the plague from the ground squirrel (*Citellus beecheyi*) to guinea pigs and from squirrel to squirrel.

Fleas as plague carriers between rats and ground squirrels, G. W. MCCOY (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 25 (1910), No. 20, pp. 659–696*).—In this paper experiments are reported which show that *Ceratophyllus acutus* can transmit bubonic plague from the ground squirrel (*Citellus beecheyi*) to white rats, and that *C. fasciatus*, the common rat flea of California, can transmit the disease from white rats to ground squirrels.

Plague infection in a brush-rat (Neotoma fuscipes), G. W. MCCOY (*Jour. Infect. Diseases, 7 (1910), No. 3, pp. 368–373*).—An account of the occurrence of plague in a wood rat in Alameda County, Cal., as previously noted from another source (E. S. R., 22, p. 785). The gross lesions, inoculation experiments on guinea pigs, and the results of injections to determine the protective power of antipest serum are described.

The susceptibility to plague of the prairie dog, the desert wood rat, and the rock squirrel, G. W. MCCOY and F. C. SMITH (*Jour. Infect. Diseases, 7 (1910), No. 3, pp. 374–376*).—"The results of the work may be summarized as follows: The rock squirrels are quite readily infected, probably being equally as susceptible as the ground squirrel (*Citellus beecheyi*). As but one prairie dog and one desert wood rat were available, it would be unsafe to go further than to assert that the specimens tested exhibited no evidence of immunity to plague; on the other hand, judging by this one experiment they appear to be quite susceptible to the infection."

A parasitic and a predatory enemy of the flea, M. B. MITZMAIN (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 25 (1910), No. 13, pp. 393–397*).—Notes are given on the occurrence and habits of a new tyroglyphid mite, belonging to the genus Histiostoma, to which Banks has given the manuscript name *H. tarsalis*. This mite has been observed by the author on adult fleas (*Ceratophyllus acutus*, *C. fasciatus*, and *Lœmopsylla cheopis*) collected in Solano County, Cal.

The fleas when placed on rats in cages rapidly increased in numbers. Observations indicate that fleas slightly infested live as long, under the same conditions, as fleas free of mites. Although he has taken adult mites of this species from the fleas, the author is not prepared to state that it is a true parasite, since he has never seen it in the act of feeding.

A beetle (*Staphylinus* sp.) combed with fleas from the hair of live squirrels, trapped in San Mateo County, Cal., has been found to destroy squirrel and rat fleas. Five of these beetles were observed to render helpless 97 adult fleas in a period of less than 5 minutes.

The introduction of a European scolytid (the smaller elm bark-beetle, Scolytus multistriatus) into Massachusetts, J. W. CHAPMAN (*Psyche, 17 (1910), No. 2, pp. 63–68, pls. 2*).—*Scolytus multistriatus* was discovered in the United States in October, 1909, while extensive collections of leopard moth larvæ were being made from limbs of elms and ash at Cambridge, Mass.

Observations have shown that its attack is invariably above the middle upper part of the trunk and usually on the larger limbs. The beetles are quite aggressive, as many as 200 mother beetles being found in a space less than 2 ft. square on a living trunk. Larvæ were also taken from the smaller green limbs of standing trees. Without exception the 100 or more dead or dying elm trees which were removed from the streets of the city of Cambridge in 1909 showed hundreds of beetle markings and larvæ. During the course of the observations, a native American scolytid (*Hylesinus opaculus*) which lives only in dead wood, was also found in abundance.

A catalogue of the genera of Staphylinidæ, F. EICHELBAUM (*Mém. Soc. Ent. Belg., 1909, No. 17, pp. 71–263*).—The references, synonomy, geographical distribution, number of species, and habits of the known larvæ are given under each genus. The author lists 815 genera and 11,801 species in this way.

A new enemy of the coffee tree, P. MARCHAL (*Jour. Agr. Trop., 9 (1909), No. 98, pp. 227, 228*).—The author reports that *Xyleborus coffeæ* is a source of great injury to the coffee tree in Tonkin.

A new coffee pest in Java, H. W. VAN DER WEELE (*Bul. Dépt. Agr. Indes Néerland., 1910, No. 35, pp. 1–6; Teysmannia, 21 (1910), No. 4–5, pp. 308–316, figs. 7*).—The scolytid beetle (*Xyleborus coffeivorus*) here described as new has become a very important enemy of coffee in Java through its attacks upon the berry. No natural enemies of this pest have as yet been discovered

A new coffee pest, M. HAGEDORN (*Ent. Bl., 6 (1910), No. 1, pp. 1–4*).—A new scolytid beetle, whose injury to the coffee berry in Uganda and Angola is much similar to that of the species noted above, is described as *Cryphalus coffeæ*. The berry is attacked while quite young and green, on some plants nearly all being destroyed. Picking and burning the berries appears to be the only remedy.

Annotated list of the Asiatic beetles in the collection of the Indian Museum, N. ANNANDALE and W. HORN (*Calcutta, 1909, pt. 1, pp. 31, pl. 1*).—In this first part species belonging to the carabid subfamily Cicindelinæ are listed.

Two new aphelinine parasites of scale insects, L. O. HOWARD (*Ent. News 21 (1910), No. 4, pp. 162, 163*).—*Physcus flaviventris* is described from specimens reared from *Chrysomphalus aurantii* at Manila, Philippine Islands, and *Perissopterus carnesi* from specimens reared from *Lepidosaphes beckii* in China.

Insect galls of Springfield, Massachusetts, and vicinity, FANNIE A. STEBBINS (*Springfield Mus. Nat. Hist. Bul. 2, pp. 138, pls. 32*).—The galls formed by insects and mites are listed systematically under the plants on which they occur. An extensive bibliography and indexes of gall insects and host plants are included.

Catalogue of neartic spiders, N. BANKS (*U. S. Nat. Mus. Bul. 72, 1910, pp. 80*).—"This catalogue includes a little over 1,300 species; and there will be certainly 2,000 in our country when the West and South are explored as thoroughly as New England now is. The largest family is the Theridiidæ with 298 species; the Attidæ is next with 218; two other families, the Lycosidæ and Epeiridæ, have over 100 species in each. Sixteen families have less than 10 species apiece. A few new names have been proposed where other names were preoccupied by foreign species.

"This arrangement is very similar to that of the Marx catalogue; only a few changes have been made, such as the recognition of peculiar forms as representing families; none of these changes are new."

The Oribatoidea of Illinois, H. E. Ewing (*Bul. Ill. State Lab. Nat. Hist., 7 (1909), Art. 10, pp. 337–389, pls. 3, figs. 5*).—In this work 33 species from Illinois are described, of which 12 are new to science. Keys to the families, genera, and species occurring in the State are included. A list of the known North American species of Oribatoidea is appended.

New American mites, N. Banks (*Proc. Ent. Soc. Wash., 12 (1910), No. 1, pp. 2–12, pls. 2*).—Among the new species here described are *Halarachne attenuata* taken from a seal pup on St. Paul Island; *Gamasus frontalis* from Perognathus, Santa Rosa Mountains, Cal.; *G. calcarator* from the nest of a field mouse and *Lælaps longitarsus* from a mole's nest at Falls Church, Va.; *Pteroptus echinipes* from *Myotis lucifugus* at Homer, N. Y.; *P. grossus* from a bat at Beulah, N. Mex.; *Ornithodoros marginatus* from a cave in Cuba and also from a West Indian bat, probably from Porto Rico; *Ixodes æqualis* from the California ground squirrel (*Citellus beecheyi*) at Berkeley Hills, Cal.; *Oribatella angusta* from a nest of *Eciton cæcum* at Austin, Tex.; *Eremæus modestus* from an orange at Whittier, Cal; *Nothrus terminalis* and *Hypochthonius texanus* from a nest of *Eciton cæcum* at Austin, Tex.; and *Histiostoma tarsalis* from *Mus rattus* at Berkeley, Cal.

The straw itch (Dermatitis schambergi): A disease new to American physicians, J. Goldberger (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 25 (1910), No. 23, pp. 779–784, pls. 2, figs. 5*).—A brief summary of the knowledge of this disease. See also a previous note (E. S. R., 22, p. 783).

Small artificial ant nests of novel patterns, W. M. Wheeler (*Psyche, 17 (1910), No. 2, pp. 73–75, fig. 1*).—Emery's modification of Janet's nest for rearing ants and also a different pattern employed by F. Santschi in Tunis are described.

A hopperdozer for rough ground, A. P. Morse (*Psyche, 17 (1910), No. 2, pp. 79–81, fig. 1*).—In order to escape imparting a kerosene flavor to forage when combating grasshoppers, the author recommends that a piece of sheet-iron or other flat surface smeared with a suitable adhesive substance such as Tanglefoot be substituted for the coal-oil pan. A device which is adaptable to an uneven surface is described and figured; it is made of No. 24 galvanized sheet iron in four sections with iron or steel runners so constructed as to allow considerable movement in a vertical plane and even a folding over of the end sections on the middle ones for convenience in transportation.

New machine electrocutes tobacco bugs (*Tobacco World, 30 (1910), No. 4, pp. 12, 13, figs. 2*).—A so-called electri-sterilizer which is claimed to sterilize the adults, larvæ, and eggs, without injury to the tobacco is described and illustrated.

The result is achieved by passing the tobacco through the machine, which consists of a conveyor running through a tunnel capable of handling tobacco in bales at the rate of a bale a minute. On both sides of the tunnel about the middle of the conveyor are special vacuum tubes on the order of Crooke's tubes. These emit a powerful X-ray which penetrates the bale through the palm-leaf cover. The machine is built to work on a current of any initial velocity at hand.

Fumigation studies, I, W. M. Pierce (*Pomona Jour. Ent., 2 (1910), No. 1, pp. 140–142, figs. 4*).—This paper deals with the use of water in fumigation dosages.

Concentrated lime-sulphur, its properties, preparation and use, J. P. Stewart (*Pennsylvania Sta. Rpt. 1909, pp. 259–296, pls. 5, figs. 4*).—This is a more detailed account than that previously noted (E. S. R., 21, p. 657).

Spray and practice outline for fruit growers, H. J. Eustace and R. H. Pettit (*Michigan Sta. Spec. Bul. 51, pp. 3–16, fig 1*).—Directions are given for the preparation and use of insecticides and fungicides in combating insect enemies and diseases of deciduous fruits and potatoes.

FOODS—HUMAN NUTRITION.

Cotton-seed meal as human food, G. S. Fraps (*Texas Sta. Bul. 128, pp. 5–15*).—For several years systematic attempts have been made to use cotton-seed meal as food for man and on this account the author studied the composition of cotton-seed flour and a number of food materials made from it, the analytical data being reported in connection with a discussion of the general problem of cotton seed as a food stuff.

The table which follows shows the composition of the cotton-seed flour and several cotton-seed food products:

Composition of cotton-seed flour and cotton seed bakery products.

	Water	Protein	Fat	Nitrogen-free extract	Crude fiber	Ash
	Per ct	*Per ct*	*Per ct*	*Per ct*	*Per ct*	*Per ct*
Cotton-seed flour	7.21	48.25	12.16	22.85	3.95	5.58
Cotton-seed bread	24.98	14.13	4.85	51.98	1.95	2.11
Cotton-seed steamed bread	40.00	13.48	7.80	33.59	2.13	3.00
Cotton-seed ginger bread	22.80	17.19	11.63	42.98	2.60	2.80
Cotton-seed ginger snaps..	6.50	16.32	14.70	57.64	2.71	2.13
Cotton-seed biscuits.	11.23	18.52	11.42	51.53	3.05	4.25

"All the cotton-seed bakery products, as can be expected, are much richer in protein than those made with ordinary flour. Cotton-seed bread contains about 50 per cent more protein than ordinary bread. The difference would be less if the two contained more nearly the same quantity of water. Four or five parts of flour to one part cotton-seed meal was probably used for this bread. Cotton-seed gingerbread contains three times as much protein as ordinary gingerbread. Cotton-seed ginger snaps contain nearly three times as much protein as ordinary ginger snaps."

In his discussion the author draws attention to the fact that cotton seed has more or less proved harmful when used as food for domestic animals, particularly pigs, but he is of the opinion that the quantities likely to be used would not prove harmful to man. Nevertheless, he cautions against using too large amounts. His summary and general conclusions follow:

"Cotton-seed flour is richer in protein than meat, and resembles meat more than it does wheat flour, rice, corn meal, or other vegetable food. Cotton-seed flour could be used as a meat substitute.

"Cotton-seed flour, alone or mixed with wheat flour, can be used to prepare bread, ginger cakes, pudding, cakes, etc., which are appetizing.

"We have no reason to believe that cotton-seed flour will not be a wholesome human food, when used in small amounts to replace meat, or to reinforce a diet poor in flesh foods.

"Cotton-seed flour, being rich in protein, should not be consumed in such quantity as to make the diet one-sided, and too rich in protein. One must be careful not to over-eat it.

"Cotton-seed meal may be used as a meat substitute, in the proportion of one ounce of meal to two of meat.

"Cotton-seed meal can be used to reinforce the diet of those whose diet is deficient in protein.

"Cotton-seed meal should always be mixed with flour or meal, and with not less than four parts flour or meal to one of cotton-seed meal.

"Cotton-seed meal may not agree with some people. Every man must learn from his own experience what food agrees with him, and what does not.

"Moldy or damaged or inferior cotton-seed meal should be avoided, because it may cause sickness.

"Only experience and experiments can tell us the part which cotton-seed meal should play in nutrition and under what conditions it may prove unwholesome."

Flour: Nitrite-reacting nitrogen in, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 206, pp. 22*).—An examination was made of 223 samples of flour with special reference to the determination of nitrite-reacting nitrogen. The samples "may be taken as fairly representing flour as sold throughout Canada." Out of the total number 148 samples gave no reaction for nitrites. Of the remainder, 25 samples contained not more than 1 part per million and 50 samples contained above 1 part per million.

It is regarded as desirable to set limiting standards, as follows: "(1) A definite content of nitrite-reacting nitrogen in flour, exceeding which we may feel justified in saying 'this flour has been bleached by oxids of nitrogen;' (2) a maximum content of nitrite-reacting nitrogen beyond which we may conclude 'this flour is probably dangerous to health.'"

Concerning tea, P. A. DuPasquier (*Vrtljschr. Naturf. Gesell. Zürich, 53 (1908), No. 1-3, pp. 295-365, dgms. 4*).—In this exhaustive summary and digest of data the author presents statistics of the consumption of tea, the origin and identification of caffein, the physiological rôle of caffein in the tea plant, the most important constituents of tea leaves, and the changes which they undergo in preparing the leaf, the composition of tea, and similar topics, together with a report of extended studies of tea curing.

Pepper, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 203, pp. 31*).—A large number of samples of both black and white pepper were collected in Canada. Of 140 samples of black pepper 100 were found to be genuine, 15 doutbful, and 25 adulterated. Of an equal number of samples of white pepper 104 were genuine, 11 doubtful, and 24 adulterated, 1 sample being lost.

"Pepper continues to be the most extensively adulterated spice on the market. It is further to be noted that in certain districts of Canada the spice appears to be much more largely adulterated than in others."

Food inspection decision (*U. S. Dept. Agr., Food Insp. Decision 125, pp. 4*).—This decision has to do with the labeling of cordials.

Official inspections (*Maine Sta. Off. Insp. 22, pp. 45-56*).—This publication calls attention to the state regulations pertaining to ice cream, soda water, and carbonated beverages, and reports the results of the examination of sausage, lard, dried currants and raisins, pickles, and canned fruits.

The examination of dried currants and raisins as regards cleanliness, freedom from dirt and worms, etc., by a method which is described, indicates that "many of the currants as put up in packages undoubtedly have been put through a cleaning process and in that sense are cleaned. They are not clean in the real meaning of the word. Such expressions as 'ready for immediate use' are also misleading and unlawful on many of these goods."

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 383, pp. 5; 384, pp. 2; 386, p. 1; 387-388, pp. 2 each; 389, pp. 4; 390, pp. 2; 392, pp. 2; 393-396, p. 1 each; 397, pp. 2; 398-399, p. 1 each; 401-403, p. 1 each; 405, p. 1; 407, pp. 2;*

408, p. 1; 410–414, p. 1 each; 415, pp. 2; 416–418, p. 1 each; 422, p. 1; 424, p. 1; 426, p. 1; 427, pp. 2; 428–429, p. 1 each; 433, p. 1; 434, pp. 2; 436, p. 1; 438, pp. 2; 439–441, p. 1 each; 442, pp. 2; 443, p. 1; 444, pp. 2; 447–449, p. 1 each; 450, pp. 8; 453, pp. 2; 454, p. 1; 455–456, pp. 2 each; 457–459, p. 1 each; 461–462, p. 1 each; 465–467, p. 1 each; 469–470, p. 1 each; 471, pp. 2; 472, p. 1).—These notices of judgment have to do with the adulteration of coffee, sardines, corn flour, olive oil, frozen eggs, and oysters; the misbranding of coffee, olive oil, oil of lemon, ice cream powder, maple sirup, canned corn, lemon extract, apricot brandy, peach brandy, jelly (currant) and preserves (Loganberry), lithia water, Holland rusk, a so-called skin food, canned pineapple, flour, canned blueberries, drugs and drug products (including among others headache preparations), grape juice, canned tomatoes, table sirup, vermouth, and a gluten breakfast food; and the adulteration and misbranding of maple sirup blend, olive oil, tomato catsup, vanilla extract, powdered colocynth, vinegar, banana extract, coffee, orange extract, maple sirup, ice cream, lemon flavor, evaporated apples, laudanum, a soft drink, and canned corn.

Administration of the food and drugs act, V. G. HEISER (*Ann. Rpt. Bur. Health Philippine Islands, 1909, pp. 29–32*).—Of 415 samples of foods, drugs, and food accessories examined 213 were found to be adulterated, misbranded, or otherwise deficient.

Hearings held before the Senate Committee on Manufactures relative to foods held in cold storage (*Washington: U. S. Senate Committee on Manufactures, 1 (1910), Nos. 1, pp. 5–24; 2, pp. 25–77; 3, pp. 77–127; 4, pp. 127–173; 5, pp. 173–214*).—These documents give in full the hearings held before the Senate committee having this matter in charge.

[Food and living conditions of Central Asian tribes], A. VON SCHULTZ (*Mitt. Justus Perthes' Geogr. Anst., 56 (1910), No. 5, pp. 250–254, pls. 3*).—Data are given regarding the food and living conditions of the Kirgis, a nomadic pastoral people, and the Tadschicks, an agricultural people with stationary homes.

The management of flocks, agricultural methods, and other questions are considered. Wheat, rye, Indian corn, beans, peas, and similar crops are raised by the Tadschicks, barley and peas at as great an altitude as 3,500 meters (about 11,500 ft.) and wheat at an altitude of 3,000 meters. The Kirgis live chiefly on milk, butter, and other dairy products, bread, and soup made from pea flour or wheat flour and sour milk. The diet of the Tadschicks is much the same, except that in summer in certain regions they live chiefly upon fruit, mulberries, apricots, and apples. Mulberries are used, both fresh and dried, and a sort of flour is also ground from the dried berries.

Diet and nutrition of the Filipino people, V. G. HEISER (*Ann. Rpt. Bur. Health Philippine Islands, 1909, pp. 25–29*).—A discussion of the subject, based upon work previously noted (E. S. R., 21, p. 768).

Lessons in the proper feeding of the family, WINIFRED S. GIBBS (*New York, 1909, pp. 42*).—This pamphlet, designed primarily for use in connection with the work of the New York Asociation for Improving the Condition of the Poor, contains data on the purchase and preparation of food and suggestions for economical living. Menus are given, together with recipes and suggestions for the preparation of dishes.

Pellagra, R. D. BROWN and R. C. LOW (*Edinb. Med. Jour., n. ser., 3 (1909), No. 3, pp. 197–202; abs. in Hyg. Rundschau, 20 (1910), No. 10, p. 563*).—A description of a case in which no corn was eaten, but uncooked rice and oat flour were habitually used. The characteristic rash on the face and hands was present.

Nuclein synthesis in the animal body, E. V. McCollum (*Wisconsin Sta. Research Bul. 8, pp. 75–93*).—Experiments on nuclein metabolism were undertaken of which the primary object was to limit the phosphorus supply to inorganic forms. The author believes that a ration composed of pure proteins, fats, carbohydrates, and the necessary salts could be made sufficiently palatable to insure a satisfactory intake and utilization of food. Many devices consistent with the experimental conditions were resorted to in order to change the taste and relieve the monotony of the food supplied from day to day. Half grown rats, younger rats, and a matured rat were used in the different series.

Edestin, zein, glucose, purified butter fat, cane sugar, milk sugar, cholesterin, and ash of milk were some of the materials used in the ration, while calcium phosphate, and sodium chlorid were always added and ferric chlorid at intervals. The ration, as the author notes, contained no purins. For purposes of comparison, half grown rats were also fed the ration together with purin bases prepared from liver and an amino acid mixture from the hydrolysis of beef muscle.

Control tests were made on a ration in which casein was used to supply phosphorus and on a so-called normal ration.

Analyses were made of the carcasses of 9 of the rats and in the case of one of the rats the amount of phosphorus excreted was determined and found to be on an average 0.0063 gm. per day during a period of 8 days.

According to the author's summary, the data furnished by his experiments seem to warrant the following conclusions:

"The palatability of the ration is a most important factor in animal nutrition. Without palatability the ration may possess all the necessary food ingredients and yet fail to nourish an animal properly.

"The failure of previous efforts to maintain animals on a mixture of relatively pure proximate constituents of our foodstuffs was due to the lack of palatability of such mixtures.

"When sufficient care is given to changing the character and flavor of the food supplied in such simple mixtures, it is possible to induce an appreciable amount of growth.

"Very young animals adapt themselves to a ration possessing a low degree of palatability much better than do adults.

"Other things being satisfactory, all the phosphorus needed by an animal for skeleton, nuclein or phosphatid formation, can be drawn from inorganic phosphates.

"The animal has the power to synthesize the purin bases necessary for its nuclein formation from some complexes contained in the protein molecule, and does not necessarily use purin bases of exogenous origin for this purpose."

Experimental variation of intestinal flora by changes in diet, C. A. Herter (*Internat. Beitr. Path. u. Ther. Ernährungsstör. Stoffw. u. Verdauungskrank., 1 (1910), No. 3, pp. 275–281*).—In this paper the author summarizes and discusses investigations carried on in his laboratory.

"The bacterial changes in the intestine, the products of putrefaction and the clinical conditions may thus be varied at will by changing from a protein to a dominantly carbohydrate diet, and an exact reversal of the conditions may be induced by changing from a carbohydrate diet back to a protein diet." The author believes that one of the most interesting features of his work is "the extensive bacterial degeneration which follows the change from one diet to another. It seems . . . possible that in conditions of disease of the intestinal tract where certain undesirable bacteria abound, both on a protein diet and on a milk diet rich in carbohydrates, frequent alternations in the chemical nature

of the diet may become beneficial by interfering with the establishment of any one type of bacteria in the intestine. It appears . . . that this view harmonizes with certain well observed clinical results of variation in diet in infancy and in adult life." The author hopes that before long definite data will be forthcoming regarding "the precise influence of rapid alternations of this kind in preventing the acclimatization of well-defined but undesirable types of microorganisms.

According to the author, definite statements can not be made as yet as to the extent of the application of the facts noted to pathological conditions in man. "It is not likely that they are directly applicable, and it is doubtless true that varied researches would have to be undertaken to decide in what way the typical adaptations . . . are modified by the existence of inflammatory conditions, bacterial infections, or other pathological states."

In connection with the discussion some data are given regarding corn meal fed to monkeys used for experimental purposes. The experiments indicate that the animals may thrive for weeks and months though the diet be made up exclusively of corn meal. On a corn diet the bacterial conditions in the intestine were found to be "midway between those described as characteristic of the protein diet and those described as characteristic of the sugar-milk diet; that is to say we have represented both acidophilic bacteria and proteolyzing bacteria. Special fermentative acetic acid producing bacteria play a part in such a diet. These remarks, however, apply to the unfermented corn." When raw corn meal was fed which had fermented spontaneously owing to the presence of moisture, different phenomena were observed, but this point is not discussed further in the present paper.

The resorption of cellulose in the intestine under normal and pathological conditions, F. Moeller (*Internat. Beitr. Path. u. Ther. Ernährungsstör. Stoffw. u. Verdauungskrank., 1 (1910), No. 3, pp. 325–331*).—Experiments are reported in which 750 gm. raw carrots was added to a basal ration under control conditions. On the basal ration alone the coefficient of digestibility of cellulose was 64.9 per cent and on the diet with raw carrots 75.2 per cent. The results are discussed in comparison with results of tests which the author made under pathological conditions.

Gas resorbed in the intestine, K. Kato (*Internat. Beitr. Path. u. Ther. Ernährungsstör. Stoffw. u. Verdauungskrank., 1 (1910), No. 3, pp. 315–324*).—According to the experimental data reported, the greater part of the intestinal gas was resorbed from the intestinal walls, the resorption of carbon dioxid being especially marked. The resorption of oxygen was much smaller, while in experiments of short duration neither hydrogen nor nitrogen was resorbed. Diffusion was found to be a matter of small moment in the disappearance of gas.

The experiments are discussed with reference to pathological conditions.

ANIMAL PRODUCTION.

The laws of heredity, G. A. Reid (*London, 1910, pp. XI+548, figs. 95*).—The laws of heredity as far as known and their applications are discussed from the standpoint of a natural selectionist. The views expressed are similar to those in the author's previous books, Alcoholism; A Study in Heredity, and The Principles of Heredity, with additional data on Mendelism and mutation which have been obtained since the other books were published..

The author's views are somewhat different from those of other writers on this topic, as is shown in the following quotations: "Mutations are so rare that as factors in evolution they are negligible." "The function of sex is

to bring about the retrogression of useless characters by the blending of parental traits." "Mendelian inheritance is a human creation, and the right interpretation of the facts appears to be that nature treats mutation, when man interferes and presents them to her, as sexual characters. . . . It appears, then, that Mendelian characters are nothing other than nonsexual or semisexual characters abnormally reproduced in the mode that sexual characters are normally reproduced. It follows that experimental workers have been engaged investigating, not heredity in general, not even the function of sex, but only certain anomalies of sexual reproduction which occur under conditions of artificial selection and crossing."

An appendix by H. H. Turner contains many ideas connected with inheritance which are represented diagrammatically.

The influence of the male parent in heredity, G. Loisel (*Compt. Rend. Soc. Biol.* [*Paris*], *68* (*1910*), *No. 4, pp. 153–156; abs. in Jour. Roy. Micros. Soc.* [*London*], *1910, No. 3, p. 296*).—After making measurements of successive generations of rabbits for 5 years, the author concludes that the male parent not only determines the characters of a proportion of the progeny but modifies, in a degree which seems to be measurable, the hereditary transmission of the recessive characters of the grandparents.

The inheritance of color, conformation, and sex, M. Müller (*Arb. Deut. Gesell. Zuchtungsk., 1910, No. 5, pp. 167, pls. 9*).—This consists mainly of descriptions of the characteristics of offspring resulting from crosses between warm and cold blooded horses, between horses and asses, and between cattle and bison. Numerous theories of sex are reviewed and some additional data furnished on the inheritance of sex in horses.

The Carnegie Institution's work with poultry (*Farm Poultry, 21* (*1910*), *No. 6, pp. 169–173, 175*).—This is a criticism of the work on Mendelian inheritance in poultry from the standpoint of the practical poultry breeder.

The vitellin membrane in eggs of birds, A. Lécaillon (*Compt. Rend. Acad. Sci.* [*Paris*], *150* (*1910*), *No. 4, pp. 240–242; Compt. Rend. Soc. Biol.* [*Paris*], *68* (*1910*), *No. 5, pp. 218, 219; abs. in Jour. Roy. Micros. Soc.* [*London*], *1910, No. 3, pp. 293, 294*).—The so-called vitellin membrane of the egg of the blackbird, which the author thinks should be called the vitellin capsule, is described. It consists of (1) an internal layer, the vitellin membrane of the ovum, (2) a median layer, the remains of the granulosa of the ovarian follicle, and (3) an external layer, which is the most internal part of the theca of the ovarian follicle.

Mitochondrial elements of germ cells and chondriosomes of embryonic cells, J. Duesberg (*Anat. Anz., 35* (*1910*), *No. 20–22, pp. 548–553, figs. 4; abs. in Jour. Roy. Micros. Soc.* [*London*], *1910, No. 3, p. 294*).—The author shows that the chondriosomes of the somatic cells of the young embryo are of maternal origin.

The physiology of stock breeding, F. H. A. Marshall (*Jour. Roy. Agr. Soc. England, 70* (*1909*), *pp. 67–82, figs. 5*).—A general article on the phenomena attending generation in animals, with special reference to the bearing of recent investigations in physiology upon the practice of breeding.

Feeding color: An aid in studying physiological development, C. A. Rogers (*Cornell Countryman, 7* (*1910*), *No. 8, pp. 269–273, figs. 6*).—A preliminary report of work in feeding anilin dyes to fowls.

The results of feeding Sudan III have confirmed the experience of other observers. The germinal disk, albuminous center, and connecting tube remained uncolored, showing that either they contain little or no fat, or were a part of the ovary before the dye was fed. It took 14 days for the yolk to be fully formed during the heavy laying season. The color bands were much

thinner than the yellow bands of the yolk when the dye was fed daily, which would indicate that the colored food from each feeding remained in the blood less than one-half day. When all of the food was colored the yolk deposits varied in density of color. The explanation offered is that the rate of deposition of fat and albumin varied during the night and day, and that while one is being deposited heavily, the other is less abundant.

Rhodamine Red, Auramine Yellow, and Suffranine Red when mixed with the feed colored the muscles, the feathers, and the shell and albumin of the egg. During incubation the changes in color indicate that fat is formed from the protein of the albumin, and that there is more or less circulation between the yolk and the albumin.

Nutritive value of blood proteins, T. IMABUCHI (*Ztschr. Physiol. Chem., 64 (1910), No. 1, pp. 1–9; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 570, II, p. 322*).—Metabolism experiments were made in feeding dogs defibrinated ox blood.

About 86 per cent of the nitrogen was absorbed as compared with 94 per cent before and after the use of the dried blood. During the feeding period there was a loss of body nitrogen. The amount of creatinin secreted daily fell to about half the normal quantity.

Comparative study of protein cleavage in the stomach, A. SCHEUNERT ET AL. In *Festschrift Otto Wallach. Göttingen, 1909, pp. 584–630; Deut. Tierärztl. Wchnschr., 17 (1909), Nos. 25, pp. 361–363; 27, pp. 393–396; 30, pp. 437–439; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 570, II, p. 322*).—The correlations between digestion and anatomical variation of the different animals, ranging from the small stomach of a carnivorous animal to the compound stomach of a ruminant, are discussed. The pig takes a mid-position between the pure carnivorous and the herbivorous animal. In the 2-chambered stomach of the hamster, one compartment is not antiseptic, and bacterial cleavage of proteins occurs. Other characteristic differences in reference to the rate of protein cleavage and other data are noted.

[Analyses of feeding stuffs], J. HENDRICK (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 122–125*).—Analyses are reported of linseed cake, compound cake, cotton-seed meal, India rubber nut cake, linseed chaff, and rice husks.

Feeding stuff inspection (*Maine Sta. Off. Insp. 23, pp. 57–72*).—This reports analyses of feeding stuffs, which include cotton-seed meal, linseed meal, gluten feed, red dog flour, wheat by-products, distillers' grains, molasses feeds, corn bran, and mixed feeds.

Commercial feeding stuffs, J. W. CARSON and G. S. FRAPS (*Texas Sta. Bul. 127, pp. 5–104*).—This contains the text of the amended Texas feeding stuffs law, and the second report on the operation of the law. Analyses are reported of cotton-seed meal and cake, wheat, corn and rice by-products, mixed feeds, milo maize chops, Kafir corn chops, milo maize meal, Kafir corn meal, alfalfa meal, dried brewers' grains, meat products, blood meal, tankage, bean meal, and ground oats. Examples of rations for different kinds of live stock are also given by J. C. Burns.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 385, 391, 400, 404, 406, 409, p. 1 each; 432, 435, pp. 2 each; 452, 463, 464, p. 1 each; 468, pp. 3*).—These relate to the adulteration of oats, the misbranding of gluten feed and proprietary stock feeds, and the adulteration and misbranding of oats and proprietary stock feeds.

Food inspection decision (*U. S. Dept. Agr., Food Insp. Decision 124, pp. 2*).—This decision relates to the labeling of stock feeds and defines the terms nitrogen-free extract, carbohydrates, and sugar and starch.

The cost of winter grazing in East Norfolk, M. C. H. Bird (*Jour. Roy. Agr. Soc. England, 70 (1909), pp. 82–98*).—This information was obtained by sending out letters of inquiry to feeders of East Norfolk, England, who buy store bullocks in the fall, turn them out to pasture for a time, and then put them in the feed lot with turnips and concentrates as the main part of the ration.

The average figures received from 40 graziers were as follows: The number of weeks spent in fattening was 21½, net gain in value per animal 10s. 6d., amount of roots given per day 1.33 lbs., weight of chaff per day 6 lbs., other feeds 7¾ lbs., total cost per day, including 6d. per week for labor, 11½d. Some of the conclusions reached were that local graziers are not making so large a profit as they hitherto had thought; that the longer the animal is kept after 16 weeks the more uncertain the profit; and that the heaviest feeders do not always make the greatest gains.

Feeding experiments, 1909–10, A. D. Faville (*Wyoming Sta. Bul. 85, pp. 3–12, figs. 2*).—In a lamb feeding test the average daily gains per head made in 91 days by 4 lots of lambs, of 41 head each, were as follows: On corn and alfalfa 0.35 lb., barley and alfalfa 0.28 lb., emmer and alfalfa 0.29 lb., and corn and native hay 0.25 lb. The result with barley was low, as 4 of the lambs did not thrive, but through no fault of the grain. The lot fed emmer ate considerably more than those fed alfalfa or corn. It required 225 lbs., or 28 per cent, less alfalfa, and 65 lbs., or 21 per cent less grain per 100 lbs. of grain when corn replaced barley in the ration. The average shrinkage of lambs on arriving at the Denver market was 8.3 lbs. per head. It is stated that better results would have been obtained with native hay had linseed or cotton-seed cake been used as a part of the grain ration, but the object of the experiment was to approach as closely as possible the average Wyoming feeding condition.

Corn and barley were compared as concentrates in rations for 6 yearling Hereford heifers during a period of 77 days. The average daily gain per head on corn was 1.73 lbs., and on barley 1.79 lbs. The gains in both cases were satisfactory. The lot fed barley ate slightly more native hay, which was used for roughage.

Analyses of the feeds used are reported.

Protein requirements of growing cattle under one year of age, P. N. Flint (*Georgia Sta. Bul. 90, pp. 87–105, figs. 12, chart 1*).—This bulletin reports the results of experiments with 19 steers and 4 heifers to determine the protein requirements of calves, principally of the dairy type.

In a preliminary period of 30 days each animal was fed as prescribed by the Wolff-Lehmann feeding standards. The experiment consisted of 2 periods of 88 days each. "It was the original purpose to feed lot 2 as prescribed by the feeding standards, and lots 1 and 3 25 per cent less and 25 per cent more protein, respectively, than prescribed by those standards, the carbohydrate and fat content of the rations in each case being the same as prescribed by the feeding standards. In calculating the results, however, it was found that none of the animals consumed as much of the digestible food nutrients as was intended."

The ration consisted of corn meal, linseed meal, alfalfa hay, and oat straw, in amounts based on the live weight, using the feeding standards as a guide. "At the beginning of the second period 4 animals from lot 1, 3 from lot 2, and 4 from lot 3 were taken out of their respective lots and fed upon a different basis. With the exception of one . . . a report is not herein made of the tests with these animals."

During the first period "lot 1 consumed an average of 0.48 lb. of digestible protein daily, lot 2, 0.60 lb., and lot 3, 0.80 lb. Lot 1 made an average gain per animal in 88 days of 69.4 lbs., lot 2 72.4 lbs., and lot 3 98.4 lbs. . . . There was not much difference in the average energy content of the rations of the three lots. . . . When calculated per 1,000 lbs. live weight . . . the rations of lots 2 and 3 each contained practically 15.7 therms of energy value, and that of lot 1, 14.40 therms of energy value."

During the second period the average ration of lot 1 contained per 1,000 lbs. live weight [only] 0.10 therms more energy value than the average ration of lot 2. In respect to digestible protein, on the other hand, the average ration of lot 2 contained per 1,000 lbs. weight 0.77 lb. more than the average ration of lot 1. . . . "The average gain per animal of lot 3 was 111.4 lbs., while the gains of lots 2 and 1 were 96.4 lbs. and 68.9 lbs., respectively.

While during both periods the average gain of lot 1 was smaller than that of lots 2 and 3, and the gain of lot 2 smaller than that of lot 3, this could have been due in a large measure at least to individuality. There was but 1 animal in lot 2 and 5 in lot 3 during the first period which made greater gains than any in lot 1. Likewise, there were but 2 animals in lot 3 during the first period that made greater gains than in lot 2.

"During each period the average rations of lot 3 conformed more nearly to the feeding standards in respect to digestible protein than either of the other lots. This lot also made the greatest gains. However, since the digestible carbohydrates and fats were lower than prescribed by the feeding standards not only in case of lot 3, but in case of the other two lots as well, it would be erroneous to conclude from the data presented that the Wolff-Lehmann feeding standards do not prescribe too great an amount of protein, because had more carbohydrates been consumed it is probable that as great gains would have been made on less digestible protein. Also judging by the variations in gains by individuals of the different lots it would be necessary, before true comparisons could be made, to feed a large number of animals in order to eliminate the factor of individuality. These results bring out the fact that no single feeding standard can be devised which will prescribe an amount of digestible food nutrients to meet the exact requirements of all animals."

"A determination of nitrogen balance with two animals of each lot indicated that those of lot 3 did not retain any more protein than those from the other lots."

Methods of steer feeding, T. I. Mairs and S. W. Doty (*Pennsylvania Sta. Rpt. 1909, pp. 146–153, chart 1*).—This test was designed to compare a limited with a full grain ration by substituting silage for a portion of the ear corn, and is a continuation of a test previously noted (E. S. R., 20, p. 866).

From November 4 to February 24 the ration for 2 lots of 12 steers each consisted of broken ear corn, cotton-seed meal, silage, and hay or corn stover. The steers in lot 1 received a daily ration of 2 lbs. of cotton-seed meal, 7.5 lbs. of silage, and all the ear corn they would eat with relish, and made an average daily gain of 1.65 lbs. per head at a cost of 16.4 cts. per pound. Lot 2 received 2½ lbs. of cotton-seed meal, 15 lbs. of silage, and two-thirds as much ear corn by weight as lot 1, and made an average daily gain of 1.83 lbs. per head at a cost of 11.8 cts. per pound.

During the first part of the test lot 1 made better gains than lot 2, which apparently indicates that more care is required in starting steers on a heavy silage ration. Lot 1 consumed 16.5 lbs., and lot 2, 13.6 lbs. of dry matter per pound of gain. The feeds were rated as follows: Hay $10, corn stover $5, silage $3, cotton-seed meal $29 per ton, and corn 65 cts. per bushel.

Cattle feeding experiments in Britain, H. INGLE (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 168–177, figs. 3*).—A discussion of data previously noted (E. S. R., 21, p. 370).

On an average from 0.8 to 1 lb. digestible proteids per 1,000 lbs. live weight a day was sufficient for the needs of a fattening bullock. Larger amounts involved unnecessary expense. Other conclusions reached were the following: "The more carbohydrates, fiber, and fat an animal can be induced to eat up to a maximum of 15 or 16 lbs. (when expressed in terms of starch) per 1,000 lbs. live weight, the more rapid will be the process of fattening and a daily increase of about 1.8 lbs. per 1,000 lbs. live weight may then be reasonably expected."

"The deductions as to the most successful quantities of the various foodstuffs to be used in compounding rations for fattening cattle are not so sharply and clearly marked as those drawn from the consideration of sheep feeding trials."

Mexican bulls fed on English walnuts, A. SHANKLIN (*Daily Cons. and Trade Rpts.* [*U. S.*], *n. ser., 1 (1910), No. 3, p. 45*).—It is reported that Mexico imports from Spain large quantities of English walnuts, which are used for feeding fighting bulls.

The house-feeding of sheep, W. MACKAY (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 27–39, figs. 4*).—During a period of 2 months 20 sheep made an average gain of 9.3 lbs. each when kept in the open, as compared with a corresponding gain of 14.2 lbs. each when a similar lot was provided with shelter. Descriptions are given of a sheep-feeding shed.

The pasturage system for handling range sheep, J. T. JARDINE (*U. S. Dept. Agr., Forest Serv. Circ. 178, pp. 40, pls. 4*).—A report of investigations during 1909 in continuation of work previously noted (E. S. R., 21, p. 775) to determine the efficiency of the pasturage system of handling sheep with a view to the best utilization of grazing land.

The cost of maintaining 8 miles of fence for the first year was $20; for the second year, $5. Although proof against coyotes the fence did not always keep out bears or badgers.

The results obtained with experimental bands of ewes and lambs at liberty within the inclosure were favorable, as in the previous year. The pasture loss was 4 head out of a band of 2,040, less than one-fifth of 1 per cent, while the loss of bands of 2,000 heads on the outside varied from 20 to 60, or from 1 to 3 per cent. At the market prices October 1, 1909, this loss was equivalent to $16 for the pasture band, compared with $200 for each outside band of the same number. There were several factors which caused the difference in loss. On the outside range small bunches occasionally are cut off from the main band. Some of the sheep are killed by predatory animals before the loss is known. Outside bands lose a few sheep during the day by coyotes and bears in the timber and on the bed ground at night. Other losses are due to piling up timber snags and bruises. In 1908, and again in 1909, every band which grazed on the outside range adjoining the pastures sustained a loss from poisonous plants varying from 5 to 40 head.

The average gains in weight made by the lambs in pasture was 76 lbs. per head, while outside bands averaged from 55 to 67 lbs. per head. It was thought that the wool growth was heavier and cleaner than under customary methods of herding, but sufficient time has not elapsed to secure definite results. The comparison of the broadcast and corral systems of lambing on the open range with the pasture system showed that as good results were secured under the pasture system as under the other two systems, at a cost not exceeding 16 per cent of the cost of handling under the corral system and perhaps 33 per cent of the average cost of handling under the broadcast system. It is believed that

inclosures in one form or another can possibly be constructed in connection with most lambing camps.

It is concluded that range grazed under the pasturage system will carry from 25 to 50 per cent more sheep than when grazed under the herding system. This conclusion varies slightly from the previous report, and is due not to the test for carrying capacity but to the belief that an excellent herder can, to a considerable extent, allow his sheep freedom and keep them quiet, thereby increasing the carrying capacity of his range.

"It is probable that one energetic man, who understands the nature of the difficulties that may arise, can properly care for 4 inclosures similar to the experimental coyote-proof pasture [of 2,560 acres], inspecting 2 each day. In case of emergency, the 4 inclosures could be looked after in 1 day. Under such an arrangement 1 man would care for from 8,000 to 10,000 head of sheep.

The Lonk [breed of sheep], W. R. PEEL (*Jour. Roy. Agr. Soc. England, 70 (1909), pp. 111–118, figs. 2*).—This is an account of an old but little known breed of sheep peculiar to the hills along the boundary between Yorkshire and Lancashire, England. In some respects the breed resembles the Black-face Scotch, but the wool is finer and shorter. The mutton is said to be of superior quality and the fertility of the breeding stock is considerably above the average of most other breeds.

Wool growing and the tariff, C. W. WRIGHT (*Boston and New York, 1910, pp. XIII+362, charts 4*).—This book is not a narrative history of the woolen business, but a study of the broad movements in order to determine the extent to which changes in the tariff molded the fate of the sheep industry and to supply a knowledge of other forces which are at work determining its course. The author finds that the generally frontier character of wool growing in this country and the general revolution of the industry to have been the main factors.

Concerning the tariff, the author says: "In short, the most that can be said for the tariff is that, by raising the price of wool above that in the world's market, it has somewhat increased the number of sheep in the country, chiefly since the war and during the time after the rise of the industry in the Far West where the basis was independent of general farming. But though the tariff has meant a greater number of sheep than would otherwise be kept, our study points to the conclusion that the increase thus brought about is but a relatively small proportion of the total. The assertion, frequently met, that the very existence of the sheep industry of the country depends on the duties finds no substantiation in the facts of history.

"As for the future, there seems at least a chance that the tariff may play a more prominent part than heretofore. Present tendencies point to a decline in sheep raising as an independent industry mainly for wool. Mutton will increasingly become of first importance, and wool secondary. In the East, where sheep promise to be incidental to general farming, and wool subordinate to mutton, the basis of the industry will be such that the tariff on wool can be of but comparatively slight moment. In the West, which offers far larger possibilities and a more independent basis, the competition of the foreign grower is likely to become more serious, and there, in the main seat of the industry, protection can do much more for the wool grower. Still, in that section also, just so far as mutton becomes the main object in place of wool, to that extent the weight of this foreign rivalry will be lessened, the security of the industry strengthened, and the influence of the tariff diminished."

"Wool is the economist's classic example of a by-product. . . . The grower has to consider the price of the other products of the sheep in order to determine the price at which he can sell his wool or whether he can keep sheep

at all. In many cases, however, the raising of sheep is itself a by-product of general farming. Here there at once arises before us a most intricate mass of interdependent factors, all of which should be taken into account by the farmer in determining the size of his flock."

Experiments in feeding raw potatoes and potato products to swine, E. HASELHOFF (*Fühling's Landw. Ztg., 59 (1910), No. 10, pp. 329–341*).—Pigs weighing about 54 kg. each were fed a basal ration of skim milk, ground maize, wheat bran, and sesame cake for 84 days. The lot receiving a supplementary ration of raw potatoes made an average daily gain of 0.656 kg. per head, at a cost of 0.7725 marks per kilogram (about 8.4 cents per pound). The corresponding gain on a supplementary ration of dried potato chips was 0.6688 kg., at a cost of 0.8895 marks per kilogram. On a supplementary ration of raw potatoes and potato chips, which had been treated with diastase so that a portion of the starch had been changed to sugar, the gain was 0.703 kg. per head a day, at a cost of 0.7890 marks per kilogram. On a repetition of the experiment, the corresponding values on raw potatoes were 0.508 kg. at a cost of 0.9124 marks per kilogram; on dried potato chips, 0.541 kg. at a cost of 0.9549 marks; and on potato and sugar flakes, 0.583 kg. at a cost of 0.8935 marks.

Hog raising in North Carolina, R. S. CURTIS (*North Carolina Sta. Bul. 207, pp. 133–184, figs. 12*).—This bulletin on the breeding, feeding, and management of swine was prepared in response to numerous inquiries regarding the possibilities for swine raising in North Carolina. The natural advantages of the State for swine growing are discussed. It is pointed out that the hog is naturally a grazing animal, and that consequently for successful swine production forage crops should be grown. The date and rate of sowing, and approximate period of grazing, for the various forage crops are presented in tabular form. Several types of hog houses are illustrated and described. The common ailments of swine are discussed from the standpoint of prevention rather than cure.

Swine husbandry and bacon curing, L. M. DOUGLAS (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 107–117*).—A statistical article in which it is shown that there is a shortage of pigs for bacon-curing purposes throughout the world. Attention is called to the opportunities for pig breeding and bacon curing in the United Kingdom.

Decorticated peanut cake for feeding horses, J. E. LUCAS (*Rev. Gén. Agron., n. ser., 5 (1910), No. 5, pp. 225–229*).—When the bran and alfalfa in a ration for horses were replaced by peanut cake, straw, and a small quantity of molasses, the cost of the ration was reduced about 10 per cent, yet it gave fairly good results.

Feeding sugar to horses to increase working capacity, BARTHEL (*Ztschr. Veterinärk., 22 (1910), Nos. 5, pp. 210–226; 6, pp. 265–278*).—The author reviews the experimental work which has been done on this topic and contributes his own experience. Although more expensive than many other feeding stuffs, he considers sugar a valuable food for increasing the working capacity. The literature on the subject is appended.

Experimental demonstration of the mechanism of extension and inflection in the horse, ZWAENEPOEL (*Ann. Méd. Vét., 59 (1910), No. 6, pp. 322–334, figs. 6*).—A description of a mechanical contrivance designed to illustrate the dynamics of locomotion in quadrupeds is given.

The schooling of horses, J. SWIRE (*Live Stock Jour. [London], 72 (1910), No. 1891, pp. 7, 8*).—A comparison of the English and French methods of training cavalry horses in riding-school work, in the steeplechase, in long-distance rides, and in jumping competitions.

A report on the horse-breeding industry in Minnesota (*Minn. Stallion Regis. Bd. Bul. 2, pp. 148, figs. 13*).—This bulletin contains data on the horse-breeding industry in Minnesota, the text of the state stallion laws, a list of officers having charge of stallion registration laws in various States, a directory of licensed stallions owned in the State, and the following articles: How to Feed and Manage Stallions and Mares to Insure Strong, Vigorous Colts at Birth, by M. T. Grattan; Government Supervision in Horse Breeding, by J. S. Montgomery; Shoeing the Horse and Care of Feet, by A. Elliot; and The Continental Breeds of Draft Horses, by J. S. Montgomery.

Government certification of stallions, S. S. CAMERON (*Jour. Dept. Agr. Victoria, 8 (1910), No. 4, pp. 233-272*).—This is the third annual report on the veterinary examination of stallions for the government certificate of soundness and approval, with a résumé of the results during the 3 years since the establishment of a system of government control of stallions standing for public service.

The horse supply of Russia and their remount system (*Jour. U. S. Cavalry Assoc., 21 (1910), No. 79, pp. 41-51*).—This article contains brief descriptions of the breeds and types of Russian horses and an account of methods of purchasing and training remounts for the cavalry.

Egg-laying competition, 1909-10, D. F. LAURIE (*Jour. Dept. Agr. So. Aust., 13 (1910), No. 10, pp. 838-850, figs. 2*).—A report of the annual egg-laying competition ended March 31, 1910, at the Roseworthy Agricultural College. The number of pens which entered the competition was 113. The winning birds were a pen of 6 White Leghorns, which laid 1,531 eggs during the year. The average figures for all competing birds are as follows: The number of eggs laid per hen 136.03, cost of feeding per hen 5s. 6.19d., profit per hen over cost of feeding 8s. 4.2d.

Artificial incubation, G. BRADSHAW (*Dept. Agr. N. S. Wales Farmers' Bul. 22, pp. 43, figs. 30*).—This contains directions for running incubators and a brief history of artificial incubation.

DAIRY FARMING—DAIRYING.

Alfalfa hay v. timothy hay, and alfalfa hay v. bran for dairy cows, W. J. FRASER and C. C. HAYDEN (*Illinois Sta. Bul. 146, pp. 131-144, charts 4*).—This bulletin reports two demonstrations, planned to show the value of alfalfa hay in rations for dairy cows.

In the first, alfalfa was compared with timothy hay in the ordinary ration. The basal ration of 16 cows, divided into 2 lots, for 25 weeks was shredded corn stover and a grain mixture of corn meal and wheat bran 2½ : 1. During a preliminary feeding period the cows also received alsike clover and timothy hay. In the main feeding period the reversal method of feeding was followed. The last 4 weeks all cows were fed alfalfa and were pastured for a short time on green rye. The total amount of milk produced by both lots for the 6 weeks during which they were fed alfalfa was 18,496 lbs., and for the 6 weeks fed timothy 15,704 lbs.

"As soon as the hay was changed on lot 1, December 17, from mixed alsike clover and timothy to timothy, there was a sudden drop in the milk flow of about 25 lbs. per cow in 3 weeks, and this flow remained down to a little below the 190-lb. line until the close of the first period, when the hay was changed from timothy to alfalfa. As soon as this change was made there was a rapid rise, during the next 3 weeks, or up to the close of the alfalfa period. When the cows were turned on green rye, April 22, this flow was still maintained, on rye and alfalfa, for the next 4 weeks. . . .

"When the hay was changed on lot 2, December 17, from mixed clover and timothy to alfalfa, there was a slight increase in the milk flow, which continued during the alfalfa period. When the hay was changed from alfalfa to timothy, there was a rapid decrease during the next 3 weeks of 32 lbs. of milk per cow, and during the remaining 6 weeks of the timothy hay period the average flow continued to drop until there was a further decrease of 19 lbs. . . . When the hay was changed from timothy to alfalfa, April 22, and the cows turned onto green rye, it is interesting to note how rapidly the milk production increased to the same point as at the beginning of the preliminary period, 25 weeks previously, notwithstanding the fact that the grain had been reduced from 12 to 8 lbs. . . .

"Taking the average for the two lots, we find that they produced 17.7 per cent more milk while fed alfalfa hay than while fed timothy. This great difference in favor of alfalfa over timothy was not only true of the lots, but of each individual cow in the lots, which adds greatly to the evidence in favor of alfalfa hay."

The second demonstration consisted of a comparison of alfalfa hay and bran with 6 cows for 19 weeks, on a basal ration of corn silage, clover hay, and corn meal in proportions of 5 : 1 : 1. Each cow consumed nearly 8 lbs. of choice alfalfa hay or of bran daily. During the alfalfa period the cows gave 9,753.7 lbs. of milk and 395.95 lbs. of butter fat, as contrasted with 9,514.5 lbs. of milk and 400.73 lbs. of butter fat during the bran period. With the alfalfa ration the cows "consumed 20 lbs. less corn meal, 114 lbs. less silage, 32 lbs. less clover hay, and 15 lbs. less alfalfa hay than bran, because 1 cow was off feed. This difference in the amount of feed is small and amounts to little more than 1 day's ration for the lot, and could not account for more than 75 lbs. of milk. On the same feed basis, therefore, the cows produced 314 lbs. more milk and 3.5 lbs. less butter fat while on the ration containing the alfalfa hay. This shows alfalfa equal to or a little better than bran for milk production, under the conditions which are the same as those existing on most dairy farms."

Test of soiling crops for dairy cows, season of 1907, T. I. Mairs (*Pennsylvania Sta. Rpt. 1909, pp. 127–146, pl. 1, charts 4*).—This report on soiling crops is a continuation of work previously noted (E. S. R., 20, p. 373).

The crops tested during 1907 were rye, wheat, alfalfa, clover, timothy, oats, oats and field corn, and Canada peas. Tables are given showing the yields of green forage, air-dry matter, and protein, the amount fed per cow daily, and the daily yield of milk and butter fat per cow. The average yields per acre of air-dry matter from 1902 to 1907, of those crops which were grown 3 or more years in this test, were as follows: Rye 3,800 lbs., alfalfa 6,287 lbs., timothy and clover 3,305 lbs., oats and peas 2,850 lbs., corn 4,009 lbs., cowpeas 3,351 lbs., cowpeas and sorghum 4,512 lbs., and soy beans 2,871 lbs. The cowpeas and cowpeas and sorghum were in each case grown after rye or wheat, and sometimes after Canada peas and oats, so that in computing the amounts produced on 1 acre in a year these crops should be considered. There was but little difference in the varieties of sorghum grown with the cowpeas. The so-called saccharine varieties probably produced a larger percentage of leaves, whereas the Kafir corn produced a stockier plant and supported the cowpeas a little better, which is one of the purposes in growing sorghum.

There was a wide variation in the number of pounds of green forage eaten per cow. In the case of oats in 1907 the cows ate 107.4 lbs. of green forage per day, containing 20.7 lbs. of air-dry substance. They ate only 48.6 lbs. of a second cutting of alfalfa, which contained 14.3 lbs. of air-dry substance. The smallest amount of air-dry substance eaten was as rye, namely, 11.9 lbs. They

consumed the most crude protein in the first cutting of alfalfa, and the least in timothy and clover.

The decrease in milk production was greater with some crops than with others. The only instance where the average daily production for a period exceeded that of the preceding one was when the first cutting of alfalfa followed wheat, and the most rapid decrease was when timothy and clover followed oats. The amount of milk solids produced per day seemed to vary more closely with the amount of milk produced than with the percentage of butter fat. According to the author, the amount of dry matter eaten had less relation to milk production than did the amount of green forage. There appeared to be no relation between the protein supply in the feed and milk production.

A gain in live weight during this season was in every instance accompanied by a decrease in the percentage of butter fat, and a falling off in live weight in every case but one was accompanied by a gain in the percentage of butter fat. "Taking a summary of the 3 years, when the cows gained in live weight their milk fell off in richness or vice versa 153 times out of 219, or almost exactly 70 per cent of the cases. Whether this is merely a coincidence or there really is a relation, the data are not sufficient to warrant a definite statement. It is striking and might warrant further investigation. If the variation in live weight was a result of the deposition or utilization of body fat it would indicate that when a cow is fattening she does not produce as rich milk as when she is using fat already stored in the body."

Green crops for summer soiling, J. B. LINDSEY (*Massachusetts Sta. Bul. 133, pp. 3–20*).—This bulletin, supplanting Bulletin 72 previously noted (E. S. R., 13, p. 176), contains a description of the green fodders and fodder combinations best suited for summer soiling in Massachusetts. It also discusses the method of planting and time of cutting, and how they may be fed to the best advantage. Details are given for mixing fertilizers for forage crops, and tables show the composition of these crops and their digestibility.

Relative production and economy of concentrated and bulky rations, H. E. VAN NORMAN and C. L. GOODLING (*Pennsylvania Sta. Rpt. 1909, pp. 165–171*).—A report of progress on an experiment with dairy cows, in which the object was to compare the efficiency of two rations containing practically the same digestible nutrients and taken from the same feeds, but so varied in proportions as to take a large amount of the nutrients from the grain in one case and from the roughage in another. Individual records of the cows are given, but it is stated that the work does not warrant any conclusions at the present time.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 419–421, 423, 425, 430, 431, 437, 445, 446, 451, 460, p. 1 each*).—These relate to the adulteration of milk and cream and the misbranding of cheese.

On the nature of the cellular elements present in milk.—II, Quantitative and qualitative results, R. T. HEWLETT, S. VILLAR, and C. REVIS (*Jour. Hyg. [Cambridge], 10 (1910), No. 1, pp. 56–92, fig. 1*).—This is a continuation of earlier work (E. S. R., 22, p. 383).

The samples of milk were obtained from 4 farms where the environment varied considerably. About 6 drops of formalin were added to from 60 to 70 cc. of milk. This increased the count of cells when the milk stood for 24 hours, but the method gives results similar to the heating method of Russell and Hoffmann (E. S. R., 20, p. 77).

Counts made from successive portions of one quarter of the udder showed that the cells were practically uniform throughout the milking. A slight increase appeared in the strippings but was probably due to the manipulation of the udder. Apparently the cells passed regularly into the milk as the result of the general activity of the gland tissue and not as a response to any stimulus

given to the tissues by the process of milking, and were not connected with any particular constituent of the milk.

In pregnant cows there was a large increase of cells at the end of the lactation period. In one cow there was a slight and transitory affection of one quarter of the udder, which produced for a long time a large number of cells but without any change in the milk secretion either in quantity or quality, showing that the vital activity of the gland tissue was in no way affected. There was no evidence to show that such milk was injurious, yet if a cell count could be relied upon such milk might at any time have been supposed to be the product of a cow suffering from severe mastitis. One cow gave a very high count of cells from the right hind quarter from no apparent cause. In another case there was a typical catarrhal mastitis but no premonitory symptoms as regards alteration in the count. A deposit from a milk that contained large numbers of streptococci was injected into young rabbits but produced no ill effects. Injections of tuberculin did not increase the number of cells.

The microscopic examination of many films, prepared both from normal counts at different periods of lactation and from cows presenting slight signs of mastitis, revealed no cell having any decided resemblance to a polymorphonuclear leucocyte. No case of phagocytosis of bacteria was observed.

"We are of the opinion that the cytological examination of milk does not admit of any inference of the existence of a diseased condition of the cows supplying the milk. It may point to the desirability of veterinary inspection, but gives no 'a priori' grounds for condemnation of the milk."

"In the milk of healthy cows in full milk and which do not give a high cell count, the majority of cells tend to be of the type termed 'large uni-nuclears,' with a small admixture of other cells. At the beginning and end of lactation, or when the cell count is high, the multi-nuclears tend to be the predominant cell, and this is the case whether the high cell count is without discernible cause, or whether a definite mastitis is present. That is to say, a high cell count seems to be due to an increase of the multi-nuclears, and may or may not be associated with mastitis. These conclusions are in accordance with the hypotheses we have put forward as to the effect of various stimuli on the gland tissue of the udder. Substituting the word 'polymorphonuclear leucocyte' for 'multi-nuclear cell,' our results are in general in accord with Savage, but we differ entirely as to the nature and origin of the actual cellular elements. Even in the deposits from the serous fluid in catarrhal mastitis we do not find the presence of polymorphonuclear leucocytes, and must conclude that the cells of the deposit are not 'pus cells' in the ordinary acceptation. It is not in our opinion possible to recognize diseased conditions by means of a microscopical examination of the cells present."

Clean milk and commercial starters as factors in butter making, W. G. SACKETT (*Colorado Sta. Bul. 156, pp. 4–14*).—A bulletin of information for those engaged in making farm butter, concerning the advantages of using clean milk and commercial starters in butter making. Details are given for propagating and preparing the starter for ripening the cream.

Lactic cultures for dairy purposes (*Michigan Sta. Circ. 7, pp. 53–55*).—This circular contains information of a popular nature on the use of pure cultures of micro-organisms for dairy purposes.

Report of the permanent butter-scoring exhibitions at Hango, 1908, A. ANDELIN ET AL. (*Landtbr. Styr. Meddel., 1909, No. 72, pp. 25*).—Samples of butter from 258 creameries were scored during the year and examined for water content, leakage of brine, refractive index, and volatile acids. The water content ranged from 11.08 to 20.68 per cent and averaged 14.05 per cent; 998 samples out of a total of 1,052 contained less than 16 per cent of water. The fig-

ures for refractive index ranged between 49.2 and 53.0, and those for volatile acids between 24.5 and 33.1.

Report of the agent of the Finnish Dairy Association in Great Britain, 1905–1907, A. von Becker (*Årsber. Finska Mejerisamfundet Ombud i Storbrit., 1905–1907, pp. 181*).—The report gives accounts of the condition of British markets during these years, with statistics of imports and exports, prices of food products, and discussions of matters of importance to the Finnish butter export industry.

Cheese v. butter, H. W. Parry et al. (*N. Y. Produce Rev. and Amer. Cream., 30 (1910), No. 11, pp. 410–412*).—A discussion by various authors on the comparative profits in making butter and cheese.

Studies in sheep dairying, A. Burr and F. M. Berberich (*Milch. Ztg., 39 (1910), Nos. 23, pp. 265–267; 25, pp. 290–294*).—A general and statistical article on dairying with sheep in different countries. There are numerous references to literature on the subject.

VETERINARY MEDICINE.

Recent work in tropical veterinary hygiene, particularly during 1907 and 1908, P. Knuth (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 2, pp. 180–200; 7 (1910), No. 1–2, pp. 141–162*).—These articles review briefly the more important work of 1907 and 1908, respectively. Bibliographic lists of 72 and 140 titles, respectively, are appended.

Researches on poisonous and other plants, B. C. Aston (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 178–184*).—Toxicological investigations of a number of plants, including ragwort (*Senecio jacobæa*), strathmore weed (*Pimelea* sp.), waoriki (*Ranunculus rivularis*), *Discaria toumatou*, *Urtica ferox*, tutu (*Coriaria* sp.), *Dianella intermedia*, *Agathis australis*, *Ocotea* sp., and *Cyperus rotundus* are reported.

Experiments with barium chlorid, W. E. Frink and H. B. Tillou (*N. Y. State Vet. Col. [Pub.] No. 5, pp. 27–39*).—"The drug in the doses recommended acts as a purgative, in degrees according to dosage, producing evacuations varying from mild catharsis to drastic purgation. This is produced by increased peristaltic movement and increased intestinal secretion. Furthermore, the drug acts as a cardiac stimulant and tonic, lessening the number of and increasing the force of the beats, and raising blood pressure. The respirations are also reduced in number, but are deeper and more forcible. . . .

"When given subcutaneously there was some irritation at the point of injection, also more pronounced symptoms of pain. The effect was not seen as quickly, neither did the animal purge as freely. When given by mouth the effect was noted in from 20 minutes to 50 minutes. The animal purged more freely when given in a drench than when administered in a capsule. . . . The subcutaneous and intratracheal methods are unsatisfactory in doses that could be given with safety. The dose of the drug when by the mouth should be 2 dr. for a 1,000-lb. horse and 15 grains should be added to this for each additional hundred pounds weight. From the few experiments on cattle it would appear that the dosage in these animals must be larger than for a horse of the same weight. We would recommend 30 grains intravenously as the minimum dose for a 1,000-lb. cow for mild purgative action."

The danger of strewing kainit in the bedding of domestic animals, O. Brandes (*Über die Schädlichkeit des Einstreuens von Kainit in die Stallstreu der Haustiere. Inaug. Diss., Univ. Bern, 1909, pp. 45*).—Tests are reported with cows, sheep, rabbits, guinea pigs, chickens, pigeons, and a pig, from which it is noted that kainit exerts an injurious effect on the feet of the animals. In

most instances circumscribed areas of necrosis of the epithelium were present. For chickens, the substance when swallowed is irritant and toxic and often results in death.

The behavior of the leucocytes in infection and immunity, I–IV, F. W. ANDREWS (*Lancet [London], 1910, I, No. 26, pp. 1737–1743; II, Nos. 1, pp. 8–16, figs. 5; 2, pp. 83–91, figs. 5; 3, pp. 153–158, fig. 1*).—A series of four lectures on leucocytes delivered under the auspices of the Croonian lecture fund.

The first lecture considers history, phagocytosis, humoral theories of immunity, opsonin theory, aggressin theory, etc. The second deals with the functions of the polynuclear leucocytes, the distribution of polynuclear leucocytes in the normal body, the circulating leucocytes, leucopenia, the phenomenon of initial leucopenia, the initial polynuclear leucopenia as an immunity reaction, the mechanism of the leucopenia, the constitutional symptoms associated with initial leucopenia, and the relation of leucopenia to anaphylaxis.

The third lecture includes initial leucopenia in the anaphylactic animal after injection of unorganized antigens, the effect of deep ether narcosis on anaphylactic shock and leucopenia, nature of the anaphylactic state, observations on immunity in the anaphylactic animal, the leucopenia of marrow exhaustion, spontaneous marrow wasting in immunity, leucocytosis, the various types of polynuclear leucocytosis in infections, early or initial leucocytosis, and the leucocytosis of local tissue infection. The author considers the leucopenia obtained after injecting intravenously living or dead bacteria an immunity reaction, and that it may be a part of the condition known as anaphylactic shock. He terms this phenomena "anaphylactic leucopenia."

The fourth lecture considers the bone marrow in immunity, significance of leucoblastic reaction, the humoral factor, further observations on pyogenic infections, nonpyogenic infections, the varying nature of bodily defense against different bacteria, observations on harmless bacteria, pyogenic cocci, the tubercle bacillus, and *Bacillus coli* and its allies. In discussing the humoral factor the author protests against the exclusive importance attached to the value of determining the opsonic phenomena, as while it offers an easy method for estimating the general efficiency of the mechanism as a whole it is not correct to rely upon this factor as a sole index of immunity.

Modification of the relative leucocyte content by hemoptysis, ODDO and MONIER (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 19, pp. 944–946*).—After hemoptysis the lymphocytes are increased to quite an extent, with a relative diminution in the large mononuclears. The equilibrium is restored somewhat after a few hours.

Studies on endolysins, A. PETTERSSON (*Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 2, pp. 131–145; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 5–6, p. 268*).—If washed, fresh, exudate leucocytes are injected together with anthrax bacilli subcutaneously, intrapleurally, or intraperitoneally (but not intravenously) a well marked protection against culture and animal bacilli is obtained. The best results are obtained with autogenous bacteria. Leucocytic extracts also protect, but are weaker in this respect than the leucocytes themselves. When leucocytic extracts and leucocytes are injected the protection is enhanced without producing any change in the phagocytosis.

The significance of alexins for precipitating microbes and blood cells, O. STRENG (*Finska Läkaresällsk. Förh., 1910, pp. 95–106; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 4, pp. 191, 192*).—Microbes and blood cells are thrown down principally by two definite substances in the serum. The agglutinin, which combines itself directly with the cells, is specific, but the conglutinin is not specific and binds itself with the bacteria or blood cells only when

these have previously combined themselves with alexin. Alexin, which is necessary for the conglutinin, is inhibitory for the agglutinin proper.

The relation of bacterial precipitins to agglutinins, W. GAEHTGENS (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 4 (1910), No. 5, pp. 559–574*).—In view of the fact that the precipitins appear in the serum of infected animals before the agglutinins the hypothesis of Kraus, that is "that every bacterial filtrate precipitating serum also agglutinates the homologous bacteria," does not hold good. Therefore, agglutination and precipitation, respectively their antigens, are not identical.

Are methylene blue and hematoxylin antigens? M. TAKEMURA (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 5 (1910), No. 6, pp. 697–699*).—Rabbits treated with either methylene blue or hematoxylin showed no formation of antibodies.

About the passive transference of immunity against rabbit sarcoma, VON DUNGERN (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 5 (1910), No. 6, pp. 695–697*).—It was possible to transfer the immunity 3 weeks after the vaccination with rabbit sarcoma and through the agency of the serum.

A disease simulating paresis of pregnancy, S. LAUFER (*Állatorvosi Lapok, 31 (1908), No. 43, pp. 526, 527; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 22, p. 444*).—A description is given of a disease which simulates the paresis of pregnancy and occurs in pregnant animals which indulge in too much food and too little exercise before parturition. The treatment which was applied with good success consisted of injecting air into the mammary gland with Ewar's air pump. Recovery was obtained in from 1 to 2 hours. The parturition was normal.

Obstetrical aid to smaller domestic animals, W. KOPPITZ (*Tierärztl. Zentbl., 32 (1909), No. 32, pp. 506–508; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 22, p. 444*).—On the basis of experiments the author recommends manual obstetric aid for small domestic animals. The disadvantages of the obstetric forceps are pointed out.

Diagnosis of blackleg, FOTH (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 3–4, pp. 201–255, figs. 2*).—As a result of post-mortem, pathological, and bacteriological findings, the author concludes that symptomatic anthrax can be diagnosed with certainty on the basis of the bacteriological findings, particularly in cases where doubt exists after making the usual post-mortem examination. Particular attention is directed to the pathological appearances as they are described in the average meat inspection text-book and the appearances as noted in the actual examination.

Anticharbon serum therapy, L. BOIDIN (*Presse Méd. [Paris], 1910, No. 42, pp. 393–395*).—A general consideration of this subject, that is, preventive and curative serum therapy, and the mode of action.

The agglutination test in glanders, NEVERMANN (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 19, pp. 347–350*).—Results of agglutination tests carried out from April 1, 1907, to March 31, 1910, in Prussia with 1,750 horses are reported. Of this number 283 were either killed or died, of which 177 on autopsy were found to be glandered, and 69 were killed for other causes than glanders and not on the basis of the agglutination test. From the work the author concludes that the agglutination test is an excellent aid for the early diagnosis of glanders, but further that the findings with reference to the agglutination figure can only be compared when the tests are conducted by the same method and with the same standard solution, or those of equal strength.

Concerning the nature of the parasite of epizootic lymphangitis, J. BRIDRÉ and L. NÈGRE (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), Nos. 16, pp. 998–1001; 20, pp. 1265–1267*).—Deviation of complement studies here reported indi-

cate that the causative agent of epizootic lymphangitis is of the nature of a blastomycete.

Criticism of the methods of testing the meningococcus serum, S. BAECHER and J. HACHLA (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 5 (1910), No. 4, pp. 349–376; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 5–6, p. 276*).—It is shown that the complement binding and the agglutination tests do not suffice for the valuation of the meningococcus serum. The Neufeld bacteriotropic method serves the purpose better.

Rabies—hydrophobia, L. W. GOSS (*Kansas Sta. Circ. 9, pp. 4*).—A brief popular account.

Tetanus, D. K. EASTMAN and G. R. CHASE (*N. Y. State Vet. Col. [Pub.] No. 5, pp. 22–26*).—A preliminary study leads the author to think that both rhus tox and pilocarpine are useful in tetanus, largely from the eliminative standpoint.

Interim report on the animal trypanosomiases of southern Rhodesia, L. E. W. BEVAN (*Rhodesian Agr. Jour., 7 (1910), No. 3, pp. 1029–1081, pls. 2; abs. in Sleeping Sickness Bur. [London] Bul. 16, pp. 137–140*).—Field and laboratory investigations are reported.

The author finds that in the morphology of the trypanosomes in laboratory animals, in the clinical symptoms in cattle and sheep, and in the relative resistance of the smaller experimental animals, the trypanosomiasis in the Hartley district differs from that of stock in northwestern Rhodesia. He seems to have shown that transmission by flies other than *Glossina morsitans* must be rare in southern Rhodesia. Treatment was tried in a few cases with satisfactory results.

Endoglobular stages of trypanosomes, A CARINI (*Ann. Inst. Pasteur, 24 (1910), No. 2, pp. 143–151, pl. 1; abs. in Sleeping Sickness Bur. [London] Bul. 16, pp. 143, 144*).—Investigations conducted with the common frog of Brazil (*Leptodactylus ocellatus*) lead the author to believe he has obtained proof of the correctness of Schaudinn's opinion that there is a genetic relation between flagellates and endoglobular hematozoa. The author concludes that it seems absolutely certain that several trypanosomes of the blood of *L. ocellatus* can pass a phase of their life in the interior of the red corpuscles.

Glossina palpalis and Trypanosoma cazalboui, G. BOUFFARD (*Ann. Inst. Pasteur, 24 (1910), No. 4, pp. 276–295; abs. in Sleeping Sickness Bur. [London] Bul. 18, pp. 201–205*).—Calves bitten by *G. palpalis* but protected from Stomoxys bites became infected with *T. cazalboui*. The flies were found to remain infective for 2½ months, or for the maximum period during which they lived. The author concludes that the direct carrier of *T. cazalboui* is certainly Stomoxys. It may cause epizootics hundreds of kilometers from tsetse regions, but it will never succeed in keeping up an enzootic. Enzootics will always be found in the neighborhood of *G. palpalis*, the rôle of which as direct carrier is, he thinks, negligible.

Elephant surra.—Trypanosomiasis in the elephant, G. H. EVANS (*Jour. Trop. Vet. Sci., 5 (1910), No. 2, pp. 233–239, pl. 1*).—In this preliminary note the author states that the trypanosome found in cases of elephant surra can not be distinguished from *T. evansi* by ordinary microscopic examination.

A new trypanosomiasis of man, C. CHAGAS (*Mem. Inst. Oswaldo Cruz, 1 (1909), No. 2, pp. 159–218, pls. 5, figs. 10; abs. in Sleeping Sickness Bur. [London] Bul. 16, pp. 117–126, fig. 1*).—The author erects the genus Schiztrypanum for the species previously described as *Trypanosoma cruzi* (E. S. R., 22, p. 486).

The results of a study of the biology, etc., of this parasite, which is easily cultivated on the Novy-MacNeal medium, are presented in detail. It is transmitted by a reduviid bug of the genus Conorhinus, probably *C. megistus*, which has been found in the north of the State of Minas Geraes to live in human

habitations, coming out from its hiding place when the lights are extinguished and attacking the inmates, biting its human victims chiefly on the face. Numerous flagellates were found in its hind gut, and 20 or 30 days after having bitten a small monkey (*Callithrix penicillata*) numerous trypanosomes were found in the monkey's blood.

The author has succeeded in transmitting the parasite to guinea pigs, rabbits, dogs, and other monkeys, for all of which animals it is pathogenic, the least so in adult dogs. Callithrix and the guinea pig were found to be the most susceptible. In searching to discover the usual host in the region from which the infected bugs had come, the parasite was found in the inmates of the houses and also in a cat. The clinical history is given of two cases, children of 2 and 8 years, in which the parasite was found. The symptoms correspond in many respects with those of African sleeping sickness, although somnolence seems to be lacking.

Bovine tuberculosis, R. BIDART (*La Tuberculosis Bovina. Buenos Aires: Govt., 1909, pp. XV+166, pls. 32; English ed., pp. 200, pls. 32; rev. in Rev. Gén. Méd. Vét., 15 (1910), No. 178, pp. 583, 584*).—This is a report presented to the secretary of agriculture by the inspector general of veterinary police of the cattle board.

Tuberculosis in Argentina has gradually developed in proportion to the density of animal population. The danger of its presence may be considered of little or no importance in the breeding districts for the reason that the population of bovines is rarely above from 10 to 20 head per square kilometer (from 1 to 2 per 25 acres).

The action of tuberculosis on the heart, F. M. POTTENGER (*Arch. Int. Med., 4 (1909), pp. 306–322; abs. in Ztschr. Tuberkulose, 16 (1910), No. 1, p. 79*).—In advanced stages of tuberculosis the blood pressure is low. The facts contributing to this are action of the toxins on vasodilation, weakness of the heart muscle, and general emaciation. Conditions which compensate for this are hypertrophy of the heart muscle and thickening of the arterial walls. The thickening is possibly the result of the action of the toxins and is chiefly present in the older cases.

Myocarditis is common in advanced tuberculosis, and often responds to proper treatment. The heart sounds in advanced tuberculosis are hard to interpret, because pathological processes occur in and around the valves, such as infiltration, cavities, emphysema, and shrinking. In many cases the heart lies in an abnormal position and must do its work under unfavorable conditions. In estimating the size of the heart we must take into consideration that a displacement to the right and backward usually exists, with the result that the findings obtained at the usual intercostal space give no correct indication as to the size of the heart.

About placental tuberculosis, SCHLIMPERT (*Arch. Gynäkol., 90 (1910), No. 1, pp. 121–132; abs. in Ztschr. Tuberkulose, 16 (1910), No. 1, p. 80*).—The results of a microscopical examination of 11 placentæ from tubercular mothers are given. In 9 out of 10 cases positive histological findings were obtained, and in one case the tubercle bacilli were isolated in a smear.

Tuberculosis (*Michigan Sta. Circ. 8, pp. 59–63*).—A brief account of tuberculosis in which the importance of its early detection and eradication from Michigan herds is emphasized.

The value of tuberculin as a diagnostic medium, E. BIEROTTE (*Umschau, 14 (1910), No. 24, pp. 463, 464*).—An article in which the various causes of error in diagnosing tuberculosis with tuberculin are considered.

Tuberculin hypersensitiveness, K. JOSEPH (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 4 (1910), No. 5, pp. 575–583*).—Tests were made with guinea

pigs and tuberculin injected intracutaneously and subcutaneously in order to elicit whether a specific "sensibilin" could be detected. The results show that healthy guinea pigs when injected subcutaneously with tuberculin react quickly with a rapid rise in temperature. The author states that such a rise in temperature, however, must not be taken as an indication of true tuberculin hypersensitiveness. Guinea pigs which were re-treated with blood serum from tuberculous animals did not in any instance respond specifically to intracutaneous injections of tuberculin.

Action of some molds and bacteria on tuberculin, VAUDREMER (*Ann. Inst. Pasteur, 24 (1910), No. 3, pp. 189–196; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 5–6, p. 270*).—Tests were made to determine the influence of *Aspergillus fumigatus, A. niger, Penicillium glaucum, Bacillus megatherium, B. coli, B. typhi, B. enteritidis* Gärtner and *B. pyocyaneus* during growth in a media of dilute tuberculin solution upon the toxicity of the tuberculin. Of the mold fungi *P. glaucum* was found to have a markedly destructive action upon the tuberculin. *B. pyocyaneus* was found to be equally active, while the remainder had no influence at all.

From this it can be seen that it is the proteolytic organisms which are antagonistic toward tuberculin, while those organisms which attack only peptones leave it intact. Tuberculin thus seems to be a toxalbumin of the bacterial protoplasm of the tubercle bacillus.

Von Behring's protective vaccination of bovines against tuberculosis, its theoretical foundation and its practical utility, J. NOWAK (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), Nos. 5, pp. 313–347; 6, pp. 409–445*).—The results of vaccinating 202 calves (at 4 barns containing from 50 to 80 head of full grown cattle each, and which reacted more or less to tuberculin) with von Behring's Bovovaccin are given. The author concludes that at present no practical value can be attributed to vaccination, particularly as regards preventing the spread of tuberculosis among bovines, but on the other hand it seems to have no detrimental effect on the health of the vaccinated animal. The theory of the method is considered correct.

Utilizing the complement binding and the agglutination reaction for foretelling abortion in cows, H. HOLTH (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 37, pp. 686, 687*).—The author utilized for this purpose the abortion bacillus (originally described by Bang and Stribolt), which was isolated from uterine exudates in cases of abortion (horse serum from a healthy horse inactivated at 62° C. for 1 hour). Bouillon cultures of the bacterium were injected intravenously into a small horse in increasing doses until 100 cc. was given. Agglutination tests carried out with the resulting serums against various strains of the abortion bacillus showed them to be definitely positive in dilutions up to 1:10,000. The serum was finally tested against the serum of cows in 10 barns where abortion was prevalent. Thirty-eight serum tests (dilutions 1:100) were positive, giving definite reactions. The complement binding reaction was positive in 7 instances with the blood serum of the animals.

Contributions to the pathology and treatment of milk fever, BREDO (*Abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 21, pp. 430, 431*).—Calving or milk fever, according to the author, is a "hyposeroanmia," that is, it is a general, acute, progressive anemia, with a diminution of the blood serum which is dependent upon the dehydration of the blood, and which finally results in physiological congestion of the mammary gland when milk secretion begins. The name "milk fever" is not well selected, as in many instances no fever is present.

For the preventive treatment the author recommends giving the animal as much water as it desires directly after parturition and not to milk before 24

hours after the birth. In the event that the animal will not take water, thirst should be stimulated with either salt, bicarbonate of soda, or similar substances. If the disease has already set in, the classical treatment, that is, inflation of the udder with air, should be given together with intrauterine and intrarectal lavages and subcutaneous injections.

Epidemic chronic catarrhal mastitis, L. WALL (*Abs. in Berlin, Tierärztl. Wchnschr., 26 (1910), No. 22, pp. 444, 445*).—A report of cases in which 6 cows out of a herd of 60 were affected for a period of one month with mastitis is given.

On the average only one quarter was affected. The quarters were swollen and hard, but not painful. The treatment consisted of repeated injections of boracic acid solution and anointment with iodin ointment. After one of the animals was slaughtered the epidemic ceased, although sporadic cases occurred here and there. On examining the milk and on autopsy of the udder both were found to contain Grips bacilli.

Infectious lymphangitis in cattle, F. RAYMOND (*Jour. Trop. Vet. Sci., 5 (1910), No. 2, pp. 213–232, pls. 5, figs. 8*).—This is a report of investigations made during the course of an outbreak of infectious lymphangitis in some 80 out of 300 heavy draft bullocks received in Calcutta, chiefly from the Punjab.

Gastro-enteritis coccidiosis of cattle, R. E. MONTGOMERY (*Vet. News, 7 (1910), No. 334, pp. 292–296, fig. 1; Vet. Rec., 22 (1910), No. 1145, pp. 825–828*).—An outbreak of gastro-enteritis due to *Eimeria stiedæ* is reported to have occurred in Meru, British East Africa, in September, 1909.

Worm nests in cattle due to Filaria gibsoni n. sp., J. B. CLELAND and T. H. JOHNSTON (*Agr. Gaz. N. S. Wales, 21 (1910), No. 2, pp. 173, 174*).—The parasitic worms which form nodules in the briskets of Australian cattle are described as representing a new species, *F. gibsoni*. These nodules are of very frequent occurrence in Queensland and West Australian cattle and are sometimes found in animals in New South Wales.

Lip-and-leg ulceration (Necrobacillosis) of sheep, L. E. NORTHRUPP (*Amer. Vet. Rev., 37 (1910), No. 2, pp. 207–210*).—A paper presented at the annual meeting of the North Dakota Veterinary Association, in January, 1910.

Gangrenous mammitis of sheep, J. A. GILRUTH (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 292–297*).—An account of a mild outbreak associated with a micrococcus that is extremely virulent in the pure state.

Mortality among hoggets and lambs due to parasitic disease, C. J. REAKES (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 305, 306*).—An unusual mortality which occurred in Canterbury and South Marlborough among hoggets and lambs, due to the common lung worm of sheep (*Strongylus filaria*) and the stomach worms (*S. cervicornis* and *S. contortus*), is reported upon.

Hog cholera and the serum method of treatment, E. BARNETT (*South Carolina Sta. Bul. 152, pp. 3–14*).—The author reports tests made with 4 hogs ranging in weight from 91 to 106 lbs. All 4 were inoculated February 15, 1909, with 2 cc. of virulent blood. Two, which were injected with 10 cc. and 20 cc., respectively, of hyperimmune serum, were protected against hog cholera, while the hog injected with 5 cc. of serum and the one used as a check succumbed to the disease.

The author concludes that even the small dose of 5 cc. of serum increased the resistance to hog cholera. So far as could be seen the 10 cc. dose afforded as efficient protection as the 20 cc. dose.

On March 18 the hog which had been injected with 20 cc. of serum was inoculated with 10 cc. of the original virulent virus in order to test the duration of the immunity. The animal responded only by a rise in temperature for 2 days with accelerated breathing, apparently regaining normal condition again

on the following day. Six and one-half months later the same animal was inoculated with 5 cc. of virulent blood collected from an acute case of hog cholera and there was no noticeable effect.

The author concludes that not only did the animal still possess immunity 6 or 7 months after inoculation but also that this immunity was efficient against the attacks of the virus from a totally different outbreak. He further concludes that the "serum kept for 12 months at ordinary temperature was still capable of protecting hogs weighing around 90 lbs. in doses of 20 cc. against a fatal dose of virulent blood, though in this case it would probably have been better to have increased the dose in view of the fact that the animal was slightly sick for 2 days."

Several field tests are reported, the evidence gained from which points conclusively to the efficiency of the serum in protecting hogs from hog cholera if used before the animals become actually diseased.

Contagious pneumonia in pigs (swine plague) associated with the presence of a hemameba in the red corpuscles and blood plasma, J. A. GILRUTH (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 301–304*).—The author reports upon an outbreak in which 42 pigs, from 3 to 4 months old, out of a lot of 100 had succumbed at the time of the investigation.

A contribution to the clinical diagnosis and treatment of schlerostomiasis, BOCHBERG (*Ztschr. Veterinärk., 21 (1909), No. 6, pp. 271–275; abs. in Vet. Rec., 22 (1910), No. 1124, p. 489*).—An outbreak of disease due to *Schlerostomum tetracanthum* is reported in which 38 foals were affected. After 6 had died the remaining 32 were treated with atoxyl and all recovered. "The atoxyl was employed in part subcutaneously and in part intravenously, in doses rising from 0.2 to 0.5 gm. (3 to 7½ grains), and in individual cases up to 1.5 gm. (23 grains). The formula for the injection was 1 part each of atoxyl and pure sodium chlorid to 100 parts of distilled water."

The distribution of Piroplasma canis in infected dogs, including those treated with arsenic preparations, E. GOLDSCHMID (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 5 (1910), No. 6, pp. 663–688, pl. 1*).—This is a report of investigations of patho-anatomical changes in dogs infected with the Russian virus of *P. canis*, some of which had been treated with arsenic preparations.

A further note on the drug treatment of biliary fever or malignant jaundice of the dog (canine piroplasmosis), W. JOWETT (*Agr. Jour. Cape Good Hope, 36 (1910), No. 5, pp. 541–546*).—Since the account previously noted was reported (E. S. R., 22, p. 582), the author has treated 25 cases with trypanblau, all but 2 being cured. The experiments show that the blood of dogs which recover from the disease in virtue of the trypanblau treatment still remains infective for susceptible canines, but that such recovered animals are immune against further infection, at least for a period of 6 months after recovery. The author finds that this dye is without curative effect on the disease of goats, sheep, and cattle, known as heartwater.

A study of the control of Hæmatopinus macrocephalus and H. piliferus, H. JAKOB (*München Tierärztl. Wchnschr., 53 (1909), Nos. 11, pp. 193–199; 12, pp. 213–220; abs. in Vet. Rec., 22 (1910), No. 1146, p. 838*).—The author reports experiments that were made with two species of lice, namely, *H. macrocephalus* of the horse and *H. piliferus* of the dog, in order to determine the effect of water, air, and certain drugs used antiparasitically.

A submergence in water of from 20 to 28 hours was found to be necessary to kill them. When exposed to the sun's rays at a temperature exceeding 43° C. they were killed in two or three minutes. A watery solution of from 1 to 2 per cent of liquor cresoli saponatus in the form of baths over the whole of the body was found to be sufficient to kill the parasites in 15 minutes.

An investigation of the pathology of grouse disease, L. CORBETT and G. S. GRAHAM-SMITH (*Jour. Hyg. [Cambridge], 10 (1910), No. 1, pp. 1–36, pls. 5*).—While the causes of death of grouse are various a great majority of birds either picked up dead on the moor or caught by keepers when weak and unable to fly were found to be more or less in the same condition. They were wasted badly, infested with *Trichostrongylus pergracilis* and often also with *Davainea urogalli* or *Hymenolepis microps*, or with both.

Disease of canaries, J. A. GILRUTH (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 298–300*).—A peculiar disease affecting certain aviaries in the city of Christchurch is reported upon.

Gnathostomum spinigerum in a domestic cat, S. N. MITTER (*Jour. Trop. Vet. Sci., 5 (1910), No. 2, pp. 284, 285, pl. 1*).—This parasite, previously found in the stomach of several wild animals of the cat tribe, is reported to have been found in the domestic cat for the first time.

Notes on some parasites in Burma, G. H. EVANS and T. RENNIE (*Jour. Trop. Vet. Sci., 5 (1910), No. 2, pp. 240–256, figs. 22*).—Notes on several common parasites of elephants are given.

RURAL ENGINEERING.

Irrigation in Colorado, C. W. BEACH and P. J. PRESTON (*U. S. Dept. Agr., Office Expt. Stas. Bul. 218, pp. 48, pl. 1*).—This bulletin, which is another of the series of reports on irrigation in the arid States and Territories, contains a large amount of information of practical value to the farmer or prospective settler of Colorado. A general description is given of the State, its transportation facilities, its principal industries, climate, and soil. Tables show the amount of water escaping from the various streams of Colorado each year from the South Platte River at 4 stations, the storage capacities of reservoirs, return seepage, and the areas irrigated on the South Platte River, and the percentage of run-off and rainfall at different stations. Other topics discussed are the development of water power, the rise and progress of irrigation, Carey Act and reclamation service projects, irrigation districts, the beet-sugar industry, and dry farming and irrigation. Estimates of the cost of growing cereals, beets, potatoes, peas, alfalfa and fruit under irrigation in the State are included.

Materials used in constructing cement and concrete fence posts, H. M. BAINER and H. B. BONEBRIGHT (*Colorado Sta. Bul. 161, pp. 3–20, figs. 2*).—An abbreviated edition of Bulletin 148 previously noted (E. S. R., 22, p. 191).

The Iowa silo, J. B. DAVIDSON and M. L. KING (*Iowa Sta. Bul. 117, pp. 196–266, figs. 50*).—This bulletin contains plans and details of construction of several silos made of hollow clay building blocks, as previously noted (E. S. R., 20, p. 687).

It is claimed that nearly all of the essential merits of a good silo are possessed by this type which is known as the Iowa silo. The walls are strong, rigid, smooth, durable, fireproof, impervious to moisture, and resistant to frost. The construction is simple yet convenient and can be made with either individual or continuous doors. Five different sizes of rectangular blocks have been used. Steel wire, hard black No. 3 (¼ in. in diameter), has been found to be the most desirable reinforcement, and the working strength has been raised to 30,000 lbs. per square inch. The most convenient and advantageous place for the reinforcement is in the mortar joints, where as its thickness is less than that of the joint it does not interfere with the laying of the blocks and it is thoroughly protected from rust.

The experimental silo was washed on the inside with cement and has been entirely satisfactory, indicating that plastering on the inside or outside is not

necessary, although two of the silos described have been plastered. The durability of this silo will depend directly upon the quality of the blocks. Soft blocks which have not been properly burned should be guarded against. Curved blocks are considered greatly superior, the only spoiled silage found near the walls of one silo being a slight amount, not exceeding from 0.01 to 0.06 of 1 per cent of the total, found in the recesses of the wall, which was quite rough due to the use of long, 16-in. straight blocks.

The cost of the 13 silos described ranged from $215 to $403. Though the original cost may be more than the stave and other varieties of wooden silos, when properly constructed the block silo is practically free from any expense for repairs. Full details are given for making the foundation, laying the blocks, reinforcing the walls, and constructing the doors and roof.

The principles of brooding. The improved New York State gasoline-heated colony-house brooding system, J. E. RICE and C. A. ROGERS (*New York Cornell Sta. Bul. 277, pp. 183–217, figs. 27*).—This bulletin presents a method of brooding which it is believed eliminates at least three-fourths of the labor required to brood chickens in small outdoor kerosene-heated brooders, and has been thoroughly tried for the past 10 years. This method is recommended to a poultryman who is rearing annually 200 or more pullets for laying and breeding, and who desires to brood them during the natural season only and under conditions conducive for the production of vigorous stock.

The principles of brooding are discussed, and the details are given for constructing a gasoline heater, a summer house for cockerels, and both shed-roof and A types of colony brooder houses costing from $20.50 up, and containing 64 sq. ft. of floor space, or 0.32 sq. ft. of floor space and 1.3 cu. ft. of space per head when 200 chicks are kept. Two large windows in front give about 1 sq. ft. of glass to every 10 sq. ft. of floor area. The houses can be used the year round and are convenient for doing the work. By the use of a connecting collar 2 or more houses can be brought together and used for the winter quarters of a flock of 35 or more fowls. For convenience and economy in handling, provision may be made for moving the houses. By standing on sills 1 ft. high the house furnishes desirable shade, and also adds to the size of the yard area.

The cost of fuel for supplying heat to a given number of chickens is about the same for both the gasoline and kerosene systems. There is less danger from fire with gasoline than there is with kerosene, when the system is properly understood. The gasoline heated colony brooder house fitted with heater, piping, and all attachments complete, including labor, and ready for rearing chickens, cost in Ithaca, N. Y., $36.60 for 200 chickens, or 18.3 cts. per chicken, while the average price for outdoor brooders is about 24 cts. per chicken. The brooding system here described provides for 3 different areas of temperature within the house, namely, a high temperature under the heater drum, an ordinary living-room temperature between the drum area and the outside edge of the hover, and a coop house temperature outside the hover where the chickens have an abundance of room to exercise in the cool air. In favorable weather a fourth area is provided out-of-doors by a cloth fence enclosure, where the chickens can get to the ground early in a sunny, sheltered spot.

"Either top or bottom heat taken alone does not seem to furnish the best conditions for successful artificial brooding. The system here described furnishes heat mainly from above by radiation, slightly by air warmed before entering the hover, and in a small degree from the floor by contact. . . . The chief field of usefulness for the gasoline-heated colony-house brooding system is in the rearing of chickens in numbers all the year round in latitudes south of New York State, and all the year except during the coldest winter months in New York State and points farther north. For the rearing of winter broilers some

of the individually-heated or pipe-system booders in large, continuous brooder-houses are more satisfactory because of the saving of labor and economy of fuel."

The efficiency of hand separators, W. K. BRAINERD and W. L. MALLORY (*Virginia Sta. Bul. 186, pp. 3–19, figs. 10*).—This bulletin contains a discussion of the different methods of separating milk and reports a trial of hand separators. The authors estimate that the loss to the farmers of Virginia by the use of the shallow-pan system of separation is at least $2,000,000 per annum, or more than enough to furnish each dairy farm with an efficient separator.

Of the 8 makes of separators tested the height of the receiving can varied from 39 to 50½ in. The average time required to wash the machines ranged from 5 minutes 20 seconds to 7 minutes 14 seconds, but the variation of time was greater with the 4 different men who washed the machines than with the different makes. The power required to run the separators as determined with the cradle dynamometer without water ranged from 0.038 to 0.104 horsepower; with water, from 0.055 to 0.131 horsepower. The value of the disks was estimated by determining the centrifugal force factor by dividing the square of the velocity by the radius of the bowl, and ranged from 3,899 to 8,927. The capacity per hour varied from 450 to 650 lbs. The time the milk remained in the bowl varied from 4.3 seconds to 21.5 seconds. The separating force factor, obtained by multiplying the centrifugal force by the time, varied from 236 to 1,335. The increased capacity of each machine due to disks or internal devices, as measured by the Sharples, used as a standard of a machine without disks or internal devices, ranged from —136 to +537 per cent, but it is stated that these figures are indicative rather than positive, as the margin of efficiency and the actual amount of milk in the bowls, when running, were not accurately determined. It is thought that the close skimming qualities of each of the machines tested were sufficient for practical purposes if the dairyman will observe the rules laid down by the manufacturers for the use of the machine.

The lighting of farmhouses, I. T. OSMOND (*Pennsylvania Sta. Rpt. 1909, pp. 306–321, pls. 3*).—Photometric tests with kerosene, gasoline, denatured alcohol, and acetylene lamps are reported and discussed.

The number of candle power hours yielded per gallon by the various illuminants was as follows: "Kerosene, using flat wick 1½ in. wide, 700.13; kerosene, using Argand (central draft) burner 1½ in. diameter, 481.27; kerosene, using Argand burner ⅞ in. diameter, and mantle, 1,405.42; gasoline, using pressure (average) of 16 in. of fluid, 1,885.21; alcohol (denatured), 872; acetylene, using ½-ft. gas burner, per pound of carbide, 138.79. . . .

"All kerosene lights without mantle are of very poor quality, very unlike daylight, hard on the eyes, and hence likely to produce pain and nervous irritation and injury to health.

"Acetylene, gasoline, and alcohol (the first one a naked flame and the last two using mantles) give light of a very much better quality than kerosene, a light which in the proportions of the colors in its composition is very much more like daylight. A light of good quality can be obtained, also, from kerosene, by using a mantle. . . .

"By reason of the very excellent quality of acetylene light, and taking account of the eye injuries and pain and the effects on general health that may result from the use of ordinary kerosene light, the former may be truly much more economical than the latter, notwithstanding the greater cost per candle power of acetylene. This is true, also, of alcohol light (even at present prices), by reason of its very good quality."

Directions for constructing and using a simple photometer for home measurements of lights are given.

RURAL ECONOMICS.

Land and labour: Lessons from Belgium, B. S. ROWNTREE (*London: 1910, pp. XX+633, pls. 25, figs. 5, maps 5; rev. in Jour. Roy. Statis. Soc., 73 (1910), No. 7, pp. 781–785; Rev. Écon. Internat., 7 (1910), III, No. 1, pp. 195, 196*).—This volume contains the results of four years' investigations into the main aspects of the social and economic life of Belgium made with a view of contributing to the solution of the problem of poverty in Great Britain by throwing some light on its relation to the system of land tenure. Information is given on Belgium and her people, the land tenure system, the number of landowners and the size of their holdings, the mortgage debts of peasant proprietors, wages, hours, and conditions of work in industrial pursuits, agriculture and agricultural conditions, transport facilities, system of taxation, education, and the standard of living and housing of the working classes.

Section 3 of the volume is devoted entirely to agriculture in Belgium, in which the relative advantages of large farms and small holdings, and of proprietorship and tenancy, are discussed. A special inquiry was made into the price and rent of land throughout the country, with a view to determining the share of the profits of successful husbandry which falls to the owner of the soil. Besides general farming, market-gardening is dealt with, and the extent to which Belgium provides the food necessary for her own people is shown. The advantages derived from technical education, cooperation, and the provision of cheap credit among agriculturists, and those arising from communal ownership of land and afforestation, are considered, together with the bearing of these and other factors upon the rural exodus.

In conclusion a summary is given of the whole investigation, and the directions in which closer acquaintance with Belgium may serve to guide those in Great Britain who are seeking to improve the lot of the workers are outlined.

Land and labor in Belgium (*Field [London], 115 (1910), No. 2995, p. 893*).—This is a discussion of agricultural labor conditions in Belgium as compared with trade workers and other laborers. The facts are derived from Rowntree's Land and Labor, noted above, the article serving in a measure as a review of the book.

Studies and researches by a foreigner concerning the rural economy of certain parts of Italy according to the standards of social science, V. RACAH (*Atti R. Accad. Econ. Agr. Georg. Firenze, 5. ser., 7 (1910), No. 1, pp. 14–47*).—This is a critical examination of two works by Paul Roux, a French writer, entitled, respectively, The Rural Population of Tuscany, and The Roman Latifundium (large estate). The latter work is divided into two parts, discussing (1) the agrarian problem in the Roman district, and (2) the solution of the agrarian problem.

The first work is briefly discussed, the three types of rural economic life in Tuscany being pointed out and measured according to the latest standards of social science. The chief characteristic of this province is the subordination of the rural population to the owners of the land who dwell in the cities, who direct the labor of tenant farmers, and who supply the rural wage-earners with the means of subsistence by giving them temporary employment on farms or related industries.

It is the large estates surrounding Rome, however, which are regarded as the bane of Italian agriculture. These are either uncultivated or only slightly so and fail to give employment to laborers or to produce the wealth the land is capable of producing. The means that have been put in operation for changing the economic and social conditions of this region by the government are reported, and it is believed that with the breaking up of these fertile lands into small

holdings, the providing of funds by the government for their proper exploitation, and the practice of intensive culture there will be inaugurated a new era of prosperity in Italian agriculture.

The agricultural awakening of Egypt and the Sudan under English influence, S. STRAKOSCH (*Erwachende Agrarländer: Nationallandwirtschaft in Ägypten und im Sudan unter englischem Einflusse. Berlin, 1910, pp. XII+236, map 1*).—This book discusses the modern development of agriculture in Egypt and the Sudan, including discussions of the climate, soils, irrigation, population, and the bearing of the recent agricultural, industrial, political, and economic changes on the solution of the agrarian problem in these countries. A bibliography is included.

Law of April 30, 1909, relating to the establishment of small farm holdings in Denmark (*Bol. Agr. Téc. y Econ., 2 (1910), No. 18, pp. 645–653*).—The text of the law is reported.

List of farms occupied and unoccupied for sale or rent in New York State, R. R. RIDDELL (*N. Y. Dept. Agr., Bur. Statis. Farm Bul. 16, pp. 206, figs. 62, map 1*).—This is a list of nearly one thousand farms arranged alphabetically by counties with descriptive details, as previously noted (E. S. R., 21, p. 395).

The cooperative plan of securing farms and how it applies to the South, D. A. WILLEY (*Tradesman, 63 (1910), No. 23, p. 28*).—A description of the National Farm Homes Association, previously noted from other sources (E. S. R., 23, p. 291).

The development of agricultural credit organizations in France, L. F. VON HENNET (*Mitt. Fachberichterstat. K. K. Ackerb. Min. [Vienna], 1910, No. 9, pp. 65–67*).—This article discusses the encouragement given by the government to agricultural credit in France, with statistics of the progress made since 1904 as a result of this encouragement. The laws relating to the extension of agricultural credit are discussed, particular reference being made to the law of April 10, 1908, granting long-term credit to farmers, which has since been extended to small owners by the law of March 19, 1910 (E. S. R., 23, pp. 92, 292).

A systematic and comparative exposition of agricultural insurance legislation, H. L. RUDLOFF (*Fühling's Landw. Ztg., 59 (1910), No. 10, pp. 344–353*).—This article presents a study of the different societies and institutions for the free and compulsory insurance of crops against loss by hail and the insurance of live stock in the chief countries of continental Europe, including information on the organization of mutual societies and other insurance institutions, their management and governmental supervision, insurance rates, adjustment of claims, methods of indemnification, and establishment and use of reserve funds.

Associations for the manufacture of products, F. M. FERRONI (*Bol. Quind. Soc. Agr. Ital., 15 (1910), No. 10, pp. 386–390*).—This article gives an account of the number and kinds of cooperative associations in Italy that are engaged in working up the raw materials of agriculture into industrial products. Among the most successful of these organizations are mentioned the cooperative creameries, wine cellars, distilleries, olive oil manufactories, bakeries, and flour mills.

The author discusses the principles of such organizations, the conditions which favor their development, means of securing government aid, the difficulties and defects of organization, results attained in Italy, and the means to be taken for their encouragement. Traveling schools of agriculture with instructors capable of educating farm laborers in the manufacture of such products are advocated for encouraging the development of such cooperative industries in Italy. A brief bibliography is included.

Cost of production of Lancaster County filler tobaccos, W. Frear and E. K. Hibshman (*Pennsylvania Sta. Rpt. 1909, pp. 185–198, pls. 6*).—In order to understand the economic problems entering into a determination of the cost of tobacco production, this article presents detailed information on the conditions and methods of tobacco culture, harvesting, and curing in Lancaster County, Pa., and data relating to cost of production in 1908 as determined from 8 farms are reported in detail. The authors' summary of results is as follows:

"The cost of raising an acre of seed-leaf tobacco in Lancaster County in 1908 ranged from $90.97 to $126.74; average, $113.42.

"The yields on the farms studied ranged from 1,075 lbs. to 2,267 lbs. per acre; average, 1,639 lbs.

"The cost of raising a pound of seed leaf ranged from 4 cts. to 11.3 cts., and this without the complete accounting for petty items of expense; the average was 7.4 cts.

"Intensive cultivation tended to diminish the pound cost by greatly increasing yield; but the use of a vigorous strain of plants was most effective in increasing yield and thereby reducing pound cost.

"The expenditure upon an acre of Pennsylvania Havana did not differ materially from that on the seed leaf, but the low yield of the light upland soil—750 lbs. per acre—raised the pound cost to 13.8 cts. The profit may be as great per pound, however, since this leaf on the sandy soils yields a high-grade wrapper leaf. The gain per acre may be absolutely less than from the seed-leaf on heavier soils.

"Present total costs of production do not differ greatly from those 30 years ago."

Minor items of farm equipment, L. W. Ellis (*Ohio Sta. Circ. 98, pp. 18*).—Previously noted from another source (E. S. R., 22, p. 192).

AGRICULTURAL EDUCATION.

Forestry in the agricultural colleges and experiment stations, S. B. Green (*Forestry Quart., 8 (1910), No. 2, pp. 186–190*). This paper, read at the conference of Forest Schools, Washington, D. C., December 30, 1909, discusses chiefly the following propositions:

The agricultural colleges are the best equipped class of institutions in this country for teaching forestry, and without establishing professional schools except under certain favorable conditions, each should offer a good course in farm forestry. The teaching of forestry should not be loaded upon the professor of agriculture or of horticulture, but may sometimes be advantageously combined with the teaching of landscape gardening. Half the time of the course should be spent on identifying trees, learning their uses, and the conditions under which they grow, with enough forestry mathematics to cover the customary measuring of standing and cut timber, and with enough study of protective methods to deal with forest fires, insect pests, and fungus diseases. One semester's work in forestry can be done to advantage in the agricultural high schools, and a shorter course can be given in summer schools for public school teachers and others. A federal appropriation of $5,000 annually to each agricultural college for establishing courses in forestry and forestry demonstrations would do much to develop this work.

School teachers and the farmer's business (*Wallace's Farmer, 35 (1910), No. 34, p. 1116*).—The author of this article believes that farmers and teachers generally are indifferent or opposed to the teaching of agriculture in the elementary public schools, but that such teaching is feasible in the higher grades.

The indifference or prejudice of the farmer can be overcome by the teacher who is genuinely fond of farm life and has the tactful knowledge to give the farmer valuable information on agricultural facts. Such a teacher can also stimulate the interest of children in farm life. In arithmetic "she can say apples instead of oranges. She can talk about acres, rods, bushels, gallons of milk, pounds of butter. She can stimulate their curiosity as to the habits of animals, birds, bugs, insects, weeds, and flowers. But to do this she must be interested in them herself."

Agricultural training, G. D. BRAIK (*Wanganui Ed. Bd. Leaflet 18, pp. 4*).—This leaflet outlines a 2-year secondary course in agriculture and dairying introduced into the district high schools of Wanganui, New Zealand. The subjects of study include physics, chemistry, physical geography, botany, plant life and growth, entomology, work in the garden, manures and manuring, drainage, animal life, dairying, and economics. As a third-year course pupils may be required to conduct experiments under the supervision of the teacher. This course has been outlined with a view to the development of the nature study, practical geography, agriculture, dairying and weather studies of the primary school; the development of scientific method by the processes of observation, experiment and inference; the making of each year's course complete in itself; the preparation of the pupil for the Junior Civil Service, or the matriculation examination by the end of the second year; and the general development of the pupil.

Illustrative exhibits at state and county fairs, L. H. GODDARD and W. A. LLOYD (*Ohio Sta. Circ. 101, pp. 27, figs. 21*).—Brief statements concerning the first agricultural fair in America and the first in Ohio are followed by an account of the work of the Ohio Station in connection with county fairs, including an illustrated description of its recent exhibits. There are also items concerning an exhibit of the Ohio College of Agriculture, the exhibits of stations in other States, and statistics of attendance at fairs. The Ohio Station exhibited at 6 fairs in 1905, 9 in 1906, 7 in 1907, 8 in 1908, and 20 in 1909.

Exercises at the twenty-fifth anniversary of the establishment of the Maine Agricultural Experiment Station (*Maine Sta. Doc. 385, pp. 38*).—This gives an account of the proceedings at this meeting, which was held at the University of Maine, March 9, 1910, together with a brief historical sketch of the station. The principal address was delivered by Dr. W. H. Jordan on Conditions which Limit Agricultural Efficiency.

Information for students concerning the College of Agriculture of the University of California, E. B. BABCOCK (*California Sta. Circ. 52, pp. 8*).—This is an announcement of the courses of instruction and other information of interest to prospective students of the college.

Announcement of farmers' short courses for 1910 at the University Farm, Davis, California (*California Sta. Circ. 53, pp. 21, figs. 10*).

MISCELLANEOUS.

Annual Report of Pennsylvania Station, 1909 (*Pennsylvania Sta. Rpt. 1909, pp. 371, pls. 31, figs. 16*). This contains the organization list, a financial statement for the fiscal year ended June 30, 1909, a report of the director on the work and publications of the station during the year, and departmental reports, of which that of the meteorologist is abstracted on page 516 of this issue. The report also contains several special articles abstracted elsewhere in this issue, reprints of Bulletins 93 and 95, and a reprint, with some changes, of Bulletin 100.

NOTES.

Colorado College.—C. H. Hinman, of the extension division of the Kansas College, has been appointed director of farmers' institutes and extension work.

Idaho University.—A large building convenient to the university campus has been leased for the use of the new department of farm machinery. This building is being equipped with about $15,000 worth of farm machinery, including traction engines, motors, farm automobiles, and similar appliances. Work in farm architecture will also form a part of the course. This is stated to be the first farm engineering course to be offered in the Northwest.

Illinois University and Station.—There is an increase of over one hundred students in the college of agriculture, crowding laboratories and lecture rooms to the utmost. R. C. Obrecht, associate in horse husbandry, has resigned to engage in farming, and has been succeeded by J. L. Edmunds, instructor in animal husbandry in the University of Minnesota. P. A. Hoffman has been appointed assistant in animal nutrition in the station.

Purdue University and Station.—H. E. Allen, associate professor of animal husbandry and assistant animal husbandman in the Virginia College and Station, has been appointed instructor in animal husbandry, vice C. N. Arnett, whose resignation has been previously noted, and has entered upon his duties. M. W. Richards has been appointed assistant horticulturist and P. L. Roberts assistant in dairying.

Iowa College.—W. H. Cooper, of the University of Wisconsin, has been appointed assistant professor of dairying, vice G. T. Guthrie, who has resigned to engage in commercial work.

Kansas College and Station.—C. J. Dillon, for several years connected with the *Kansas City Star*, has been appointed editor of the college publications, and will also give courses in agricultural and industrial journalism. George S. Hine, principal of the Marinette County (Wis.) School of Agriculture and Domestic Economy, has accepted an appointment with the animal husbandry department of the extension work. In the station Dr. Otto Mauer has been appointed assistant in egg investigations in connection with bacteriological studies of the spoilage of eggs.

Kentucky University and Station.—The enrollment of agricultural students on October 10 was 68, which is an increase of more than 50 per cent over the corresponding enrollment last year. Plans are being made for a 10 weeks' short course, beginning January 1, 1911. In connection with this course the State Corn Growers' Association will hold its first annual show, January 3-6. T. R. Bryant, assistant in animal husbandry at the station, has been made assistant to Dean Scovell, and placed in charge of extension work. A judging team is to be entered in the students' judging contest at the International Live Stock Exposition for the first time.

Maine University.—M. E. Sherwin, assistant professor of agronomy, has resigned to accept the associate professorship of soils in the North Carolina College.

Massachusetts Station.—Arthur I. Bourne, of the Bureau of Entomology of this Department, has been appointed assistant entomologist, vice J. N. Summers.

Minnesota University and Station.—E. K. Slater has resigned as assistant professor of dairying. K. A. Kirkpatrick, instructor in horticulture at the Washington College, has been appointed horticulturist in the extension department.

Mississippi College and Station.—Archibald Smith has accepted the position of assistant in animal husbandry in the extension division at Clemson College, and has been succeeded by Richmond L. Shields, now assistant in agricultural extension at the Ohio State University.

Missouri University and Station.—Recent appointments include Matthew Steel, Ph. D., as assistant professor of dairy husbandry in the university and assistant dairy husbandman in the station, and E. J. Maxwell, a 1910 graduate of Purdue University, as assistant in dairy husbandry. C. A. Willson, instructor in animal husbandry, has accepted the position of professor of animal husbandry and animal husbandman in the Tennessee University and Station. R. J. Carr, assistant in animal husbandry, and F. S. Putney, assistant to the dean and director, have resigned, the former to accept an appointment in the Bureau of Animal Industry of this Department, and the latter to become professor of animal husbandry in the Rhode Island College. They are succeeded respectively by Howard Hackedorn and L. H. Allen, both 1910 graduates of the college of agriculture.

Nebraska University.—Charles B. Lee has recently been added to the staff as instructor in animal husbandry.

New Hampshire College and Station.—T. G. Bunting has resigned as assistant in vegetable gardening to accept a position as assistant to the Dominion horticulturist, with headquarters at Ottawa, Ontario.

New Jersey College Station.—Recent appointments include H. C. McLean as assistant chemist in the department of soils, and Miss Mary Robinson, a graduate of the University of Vermont, as laboratory assistant

New Mexico College.—Miss Margaret H. Haggart has resigned as professor of household economics to accept an instructorship in dietetics in the hospital department of Johns Hopkins University.

Cornell University and Station.—C. A. Publow has resigned as assistant professor of dairy industry, and will engage in commercial work in dairying in Canada. Charles F. Clark, instructor in plant breeding investigations in the university and agronomist in the station, has accepted a position in connection with the beet-sugar investigations of the Bureau of Plant Industry of this Department.

North Dakota College.—An increase of about 25 per cent in the registration is reported. Ceres Hall, the new $100,000 domestic science building and girls' dormitory, is now being occupied. It is a three-story brick structure, with 185 feet frontage, and is very completely equipped for work in home economics. Its completion provides considerable additional space for the work in agricultural engineering.

Ohio University and Station.—The enrollment of the university is the largest in its history. The greatest increase has been in the college of agriculture where over three hundred new students have been admitted, bringing the total registration in the college to over six hundred. Henry W. Vaughan has been promoted from instructor to assistant professor of animal husbandry. C. H. Goetz, of the Washington College, has been appointed instructor in forestry.

In the statin, Miss M. Helen Keith has been appointed assistant in nutrition, Paul A. Davis assistant botanist, and Ernest F. Zimmerman butter maker.

Oklahoma College and Station.—N. O. Booth has been appointed professor of horticulture in the college and horticulturist and botanist in the station, and has entered upon his duties. Other appointments include R. O. Baird as

assistant in agricultural chemistry, A. H. Wright as assistant in agronomy, and D. C. Mooring as assistant in horticulture and botany.

Rhode Island Station.—J. Frank Morgan has resigned as assistant chemist to pursue further studies in chemistry at the University of Michigan. W. F. Kirkpatrick, field assistant in biology, has resigned to assume charge of the poultry department at the Mississippi College and Station, vice J. P. Kerr.

Utah Station.—Another demonstration farm has been established near Cedar Fort Station in Cedar Valley.

Texas College.—Claude N. Evans has been given charge of the correspondence courses in agriculture. J. L. Thomas, instructor in dairying, has resigned to accept a position as field agent in the Southwest for the Dairy Division of this Department.

Virginia Truck Station.—L. E. Johnson, of Roanoke, has succeeded J. C. Carrington as a member of the governing board. F. A. Johnston, of the Bureau of Entomology of this Department, has been assigned to work with this station, vice E. G. Smyth, who has been transferred to other work in the Bureau. L. L. Corbett has been appointed assistant in truck crops. A spray laboratory and tool house and a cottage residence have recently been added to the station buildings.

West Virginia University.—Thomas Edward Hodges, formerly professor of physics, has been elected president to succeed D. B. Purinton upon his retirement next year.

Wisconsin University and Station.—The college of agriculture this year centralized its exhibits at the state fair into a single building where 7,000 feet of wall space and an equal amount of floor space were available. It was estimated that 40,000 people viewed the exhibit during the week.

A nearly doubled attendance over last year is reported for the various demonstration meetings arranged at the several county and state farms. L. F. Graber, a 1910 graduate of the college of agriculture, has been appointed assistant in agronomy with special reference to the extension work.

F. B. Hadley, of the Ohio State University, has been appointed assistant professor of veterinary science and in charge of veterinary science work in the station.

Wyoming Station.—The contract for the building of a new barn for the agronomy farm has been completed. A killing frost occurred August 24, and as a result most of the grains from the station will not be fit for seed. The frost killed potatoes, alfalfa and sweet clover, and in fact, all succulent crops.

Office of Experiment Stations.—F. W. Howe, who has been engaged in the educational work of this Office during the past 20 months, has resigned to accept a position with the New York State Department of Education as state supervisor of agricultural education. His headquarters will be at Albany, and he will have charge of the introduction of agriculture into the public high schools of the State under the new law appropriating state aid to the amount of $500 for the first teacher of agriculture employed by any high school in the State, and $200 for each subsequent teacher of this subject in the same school. The provisions of this law extend also to the introduction of home economics and manual training into the high schools.

Enlargement of Facilities at Rothamsted.—A society has been organized under the presidency of the Duke of Devonshire for the purpose of raising $25,000 for the purchase of about 200 acres of land adjoining the present experimental fields at Rothamsted and erecting buildings for feeding experiments with crops to be grown there. It is announced that about $7,000 has already been subscribed.

Consolidation of Institutions for Agricultural and Veterinary Instruction in Argentina.—A consular report from South America announces the incorporation

of the National Agronomic and Veterinary Institute of Argentina with the University of Buenos Aires at La Plata. Previous to this time there has been an agronomic and veterinary faculty in the university, and the consolidation with the institute, which was established in 1904, with the consequent strengthening of the teaching staff, is expected to produce a very complete course of instruction. The total attendance in the university now reaches 4,364, divided between the faculties of law and social science, philosophy and letters, medicine, and the physical and natural sciences.

Forestry Instruction in the Philippines.—The regents have sanctioned a proposal by the Philippine Bureau of Forestry to inaugurate a course in forestry at the college of agriculture. The course is so arranged that boys who have completed the seventh grade can enter and graduate in 4 years. The first two years' work will be identical with that of the agricultural students, including courses in English, mathematics, botany, zoology, and entomology, and the last 2 years will cover technical work in forest surveying, physiography, and other auxiliary branches.

Probably half of the work will be practical field training, while during the spring vacations the whole class will go into camp in some forest where extensive lumbering is in progress. The director of forestry and the director of civil service have agreed that all Filipinos completing the course may be appointed as rangers without examination. No tuition will be charged, and the Bureau of Forestry will appoint 20 students this year who will receive about $20 monthly in addition to quarters and transportation.

Miscellaneous.—*Revista Industrial y Agricola de Tucuman* is being published as a monthly by the agricultural experiment station at Tucuman, Argentina, of which R. E. Blouin and Fritz Zerban, formerly of the Louisiana Sugar Station, are respectively director and subdirector. The publication is to be devoted to the furthering of the agricultural interests of the Province of Tucuman, especially the sugar industry, and will serve as a medium for the publication of results obtained by the station. The initial number contains the rules governing the station, an account by the director of its function and work, and brief articles on various phases of sugar production.

A recent number of the *Bulletin of Miscellaneous Information* of the Royal Botanic Gardens, Kew, announces that L. Lewton-Brain, formerly mycologist and lecturer in agriculture to the Imperial Department of Agriculture for the West Indies and afterwards assistant director in the division of physiology and pathology in the Hawaiian Sugar Planters' Station, has succeeded W. J. Gallagher, resigned, as Director of Agriculture in the Federated Malay States.

J. B. Carruthers, assistant director of agriculture in Trinidad, died July 17. Mr. Carruthers was in his forty-first year and was most widely known for his studies on cacao and rubber diseases, which were carried on in Ceylon and the Federated Malay States.

J. H. Grisdale, of the Canadian Central Experimental Farm, has been appointed Dominion agriculturist, with supervision of operations at all branch stations and at the Central Farm in both animal husbandry and field crops.

The *Missouri Valley Veterinary Bulletin*, formerly published at Topeka, Kans., is now being issued in Chicago under the title of the *American Journal of Veterinary Medicine*.

The second annual meeting of the American Society of Animal Nutrition is to be held in Chicago, November 29, in connection with the International Live Stock Exposition.

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EXPERIMENT STATION RECORD.

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While there are no statistics available regarding the vast sums of money which have been expended during the past ten years in the construction and improvement of irrigation works by private enterprise, it is estimated that this amount would reach $300,000,000. To this should be added the expenditures of the Reclamation Service, which in eight years have aggregated nearly $60,000,000.

This phenomenal activity in the organization and construction of irrigation enterprises has provided immense areas of land with water supplies, present and prospective, and has brought forward a new phase in the settlement of the arid country. In a measure the problem is shifting from the purely engineering side to the agricultural side. At present the question of land reclamation is not so much the construction of new works for additional water supplies as the wise use of the land and water already available. This agricultural side of irrigation was strongly emphasized by Dr. Samuel Fortier, of this Office, in a paper before the last irrigation congress at Pueblo. This paper served to contrast the view of reclamation by irrigation as an engineering problem solely with that of an agricultural enterprise the success of which involves the highest and best use of the land and water by the farmers under the system.

Notwithstanding the large number of people who have recently settled in the West, there is still a very large area unsettled. It is estimated by the field agents of this Office that there are at present about six million acres under ditch, but unirrigated for lack of settlers. The magnitude of the task involved in bringing this land under agriculture may be realized from the fact that in fifty years only about double this acreage has been reclaimed. The vast expenditure of money for irrigation works has created no end of new issues which must be successfully met and overcome before adequate returns can be obtained on the money invested.

There has been a failure to estimate at their true value the many factors which enter into the reclamation of arid lands. The common conception is that when the water supply is once furnished the problem is solved. To the majority there has seemed to be little call for the exercise of high professional skill beyond the planning and building of an efficient plant. Doctor Fortier expressed the view, from his

long experience, that "the agricultural side of irrigation transcends all others in importance and demands the chief consideration on the part of the people of the West."

The one-sidedness of engineers in regard to this matter has led to a careful study of one half of the problem and the ignoring of the other half. As one result of this, large sums have been expended in providing water for land of an inferior quality. Where there is such an abundance of good land it seems a grave mistake to waste the scanty water supply on poor soil. These matters need consideration at the very first stages. No one who views irrigation from the agricultural standpoint will doubt that the character of the soil on which the water is to be used, the crops which can be grown, the presence or absence of alkali, the formation of hardpan near the surface, and the tendency to become water-logged and to require drainage, are questions whose consideration is as essential to the success of an irrigation enterprise as is the character of the structures used to provide a water supply.

The tendency to ignore the agricultural side of irrigation has likewise resulted in the locating and building of canals on ground that was too porous to retain water, and in planning and building systems without adequate provision for either maintenance and operation or water distribution and delivery. The duty of water has also been arbitrarily fixed by men who knew little of the water requirements of crops or the needs of the men who are to use the water. Enterprise after enterprise is being undertaken under the Carey Act, in some of which the cost of water will reach as high as $70 per acre, and yet the only questions which are thoroughly considered are the sale of bonds and the engineering features. Whether the farmers who are induced to settle under these projects can afford to pay so much for a water right seems to be too trivial a matter to be considered. In some cases the credulous conservative farmer is beginning to lose faith in engineer's estimates regardless of any possible extenuating circumstances. He is first led to believe the price of water will be only $20 an acre, then it is raised to $30, and subsequently to $40, or even higher.

Again, the providing of an irrigation supply often stops short in its application to agriculture at a very vital point. The usual custom in the past has been to convey water to the highest point of each section of land, or to its main subdivisions, and leave to men unfamiliar with irrigation the task of planning and building distributaries for the farms. The fact is too often overlooked that each farm unit under a canal system forms an important part of the whole, and that all the revenues of the system must come from the irrigated farms. Men are slow to recognize that it requires as much experience and ability to establish a proper system of irrigation on a forty-acre farm as to build a portion of a main canal. The only

safe course to pursue, if success is to be assured, is to plan and construct the irrigation system of each individual farm with the same care and skill that are exercised in the larger features of the plant.

In every attempt to convert desert land into fruitful fields there is a transition period which tries men's souls to the utmost. This transition from sage brush to profitable crops calls for the exercise of skill and patience and self-denial to which the settlement of the prairie lands of the Mississippi Valley is not comparable. The most profitable crops on an irrigated farm require time to mature. The land for vineyards and orchards must be thoroughly prepared before the plants are set in the ground, and a period of varying length must intervene before any returns can be expected. Staple crops like alfalfa often fail to give a heavy yield on new land the first season.

The new settler with limited means is forced to confine his efforts at first to the seeding of small patches of grain and the planting of vegetables, and to work into more profitable crops by degrees. In this transition period, which marks the passing of the desert plants and desert conditions and the introduction of profitable crops under irrigation, the new settler is especially in need of help; and the measure of success which a new irrigated district attains will depend in no small degree upon the assistance which is given the new farmers during the first three years of their fight with the desert.

Attention has frequently been called to the waste of water in irrigation in the West. Too much water is used, and there is an inclination to rely too much on irrigation and too little on cultivation. After all, the man is the most important factor in irrigation as in other farming. There is great need throughout the irrigated districts not only for more farmers but for better farmers. The difference between a heavy and a light yield can in very many instances be traced to the man who grows the crop. As a whole, the distinguishing feature of the good farm in the irrigated districts is usually the good farmer, which often transcends differences in the quality of the soil. It usually happens that the careless farmer who applies from three to four acre-feet of water per acre receives much less from the soil in the way of crops than the more careful farmer who uses less than half this amount.

Some twenty years ago it was feared that the water supplies of the West would pass eventually into the hands of rich corporations who would oppress the water users by levying heavy tribute. There are now few such corporations in existence; the companies organized for the purpose of selling water rights and collecting water rentals have sold out as a rule to the farmers who own the land under the system. There is still no end of monopoly in irrigated waters, but the monopolists do not happen to be wealthy capitalists. They are the farmers who have received more than their legitimate

share of water. All over the arid region individuals, associations, and corporations composed of farmers have received from the courts two, three, and even four times more water than their crops require under economical use. Until such evils are remedied this region can never hope to possess that extent of irrigated land which its available water would furnish if equitably apportioned.

Sometimes the blame rests with the state legislatures in placing the maximum amount of water which a farmer is entitled to use at so high a figure that waste is almost certain to result. In certain warm parts of the arid region, where evaporation losses are heavy, the continuous flow of 1 cubic foot per second, when economically used, serves from 250 to 400 acres. In some of the colder parts of the arid region, with less evaporation, the same quantity of water serves only 70 acres.

These things emphasize the need of more attention to the methods employed in the distribution, delivery, and application of water, and until this is done it is evident that water will not be economically used in irrigation. So long as we continue to magnify the importance of building costly structures and belittle the more important work of raising valuable crops, just so long will careless, slipshod methods prevail. In the past decade millions of dollars have been expended in securing water, but the assertion is ventured that for every $500 so expended less than $1 has been used in assisting the farmers to make a wise use of the water provided. A candid consideration of the present stage of progress leaves no other conclusion than that the material prosperity of the western country is dependent on the better development of the agricultural side of irrigation.

It was the purpose of the organizers of the Brussels Exposition of 1910 to make it more than a demonstration of the industrial and commercial activity of the nations participating. With a view to giving it a permanent intellectual value, a series of congresses and conferences was provided for as one of the main groups of the exposition, which were held from April to October. There were some sixty-nine of these congresses and a number of conferences, which had to do with a wide variety of subjects.

Among the congresses of special interest to students of agriculture may be mentioned the international congresses of horticulture, botany, tropical agronomy, entomology, popular education, agricultural associations and rural demography, apiculture, and alimentary hygiene and the rational nutrition of man, as well as conferences which had to do with municipal sanitation and domestic architecture.

The Brussels congress of alimentary hygiene and the rational nutrition of man was the second international congress to be held, and like the first is due to the initiative of the French Société Scientifique d'Hygiène Alimentaire. It may be mentioned in passing that this

society was formed to further the study of nutrition problems in France, because it was recognized that the extended work which had been carried on in the United States, Germany, England, and other countries had yielded results of very great value. Among the organizers were Dr. H. Ricard, senator from the Côte-d'Or; M. Berthelot, the permanent secretary of the Academy of Sciences; Prof. Armand Gautier, Dr. L. Grandeau, Dr. Henri de Rothschild, M. Kaufmann, professor at the National Veterinary School at Alfort; H. Vallée, and others, the list as a whole including the names of men eminent in nutrition, chemistry, agriculture, hygiene, veterinary medicine, analysis and inspection work, and other topics pertaining to the general subject of hygienic and rational nutrition.

The society received the recognition of the French Government and established a journal, the *Révue de la Société Scientifique d'Hygiène Alimentaire*, which records the proceedings of the society and prints original articles and abstracts and reviews of current literature. It is interesting to recall that the first article in the first issue of this journal dealt with the scope and extent of the nutrition investigations of this Office, and that in his introduction Doctor Grandeau, the author, made special mention of the society's indebtedness to Prof. W. O. Atwater, who took an active interest in its organization.

Recognizing the desirability of international conference and coöperation, the society organized the first international congress, which was held in Paris in 1906. In the attendance, the interest manifested in its work, the high grade of papers presented, and the importance of its deliberations, the congress was a marked success. When the second international congress was being arranged for, the society selected Brussels as the place of meeting, and formulated plans for a gathering on the same general lines as the Paris congress.

The foreign countries invited to participate in the Brussels congress were asked to form organization committees, and Dr. H. W. Wiley, chief of the Bureau of Chemistry, acted as chairman of the American committee. Dr. C. F. Langworthy, who was chairman of the American subcommittee of section 1, biological physics and energetics, also supervised the collection of American papers on nutrition and other branches of home economics, and was in attendance at the congress.

The Brussels congress was divided into seven sections, namely: (1) biological physics and energetics; (2) physiology and physiological chemistry—rational nutrition and dietetics; (3) hygiene of nutrition, bacteriology, and parasitology—food poisoning; (4) food materials—their composition, analysis, and adulteration, with subsections on general food materials and on dairy products; (5) potable waters;

(6) legislation, inspection, suppression of fraud, statistics of food adulteration; and (7) teaching of rational nutrition and hygiene—methods of popular instruction in the subject, cooperative work, administration of food work, food charity work, and food in relation to sociological questions.

The congress was called under the patronage of the King of Belgium and the Belgian Government, and numbered among its officials many men of prominence. Its sessions, as of other congresses at the Brussels Exposition, were held in the Palais des Fêtes. The attendance was large, particularly the representation from various European countries.

The principal activities of the congress centered in the section meetings and the general conferences, both of which were of great interest. The plan was followed of printing and distributing the papers in advance, with a view to economizing time, as an author could then simply summarize his paper and present his results for discussion. The plan adopted permitted the greatest possible amount of discussion and interchange of information in a given time. In many cases recommendations were adopted regarding future work having to do with the subjects presented.

Much interest was manifested in the energetics of nutrition, and the papers in section 1, which had to do with this subject, were particularly numerous. The interest in questions of hygiene was shown by the able papers in section 3, which included such topics as the danger of exposing foods for sale without due protection from dust and dirt, physical methods for preserving food, including sterilization and refrigeration, food poisoning of different types, chemical and bacteriological requirements for potable waters, and the prevention of tuberculous infection through milk. Other papers which had to do with milk and dairy products formed a part of the list presented in section 4.

The list of papers in section 7, likewise a long one, treated of such subjects as the feeding of infants, the food of laboring men, diet in different climates, army diet, and diet in rural regions. The educational side of the work was also strongly emphasized in this section with papers on the teaching of nutrition in schools, the methods followed in Holland in popularizing work in rational nutrition and hygiene, and the methods of teaching home economics followed in a number of American colleges.

In view of the interest and activity in human nutrition in this country, as evidenced by the work and the teachings of the Federal Department, the experiment stations, and the agricultural colleges, it seemed desirable that the American work along these lines should be adequately represented at the Brussels congress, and an effort was accordingly made to collect papers and other illustrative material.

The response from the teachers, investigators, and others concerned was quite general, although the time was short. Some thirty papers were received from the land-grant institutions, other colleges, normal schools, etc., in the United States, which give domestic science courses.

These papers treated of such subjects as descriptive accounts of courses in home economics at the University of Wisconsin, University of Minnesota, Teachers College, and University of Illinois; the respiration calorimeter of this Office and the work undertaken with it; the respiration calorimeter used in cooperative experiments at the Institute of Animal Nutrition, Pennsylvania State College; the American Home Economics Association and its work; a brief account of the nutrition work of this Office; and a summary of nutrition literature which has appeared in the United States since the previous congress.

In presenting the American work to the conference, Doctor Langworthy briefly outlined its scope, the agencies engaged in it, and discussed certain features of the findings and the general result of the movement. Prof. Paul de Vuyst, inspector of agriculture in Belgium, also spoke of the character and extent of this movement in the United States and paid attention particularly to the work in nutrition in the agricultural colleges and this Department.

Such successful conferences serve to bring out the common interest in investigation, irrespective of the locality where it is made, and demonstrate the large human element involved in a special line of research and its application, which has become world-wide. The better understanding of the work and methods employed in different countries, and the zeal and inspiration gathered from personal contact with the leading workers are an important product of such meetings.

The death of Prof. William Henry Brewer, which occurred at his home in New Haven, Conn., November 2, removes an interesting figure, whose name is associated with the history of the earliest undertakings in agricultural instruction.

Professor Brewer was a native of New York State, where he was born September 14, 1828. After attending the Ithaca Academy for three winters he entered Yale University. A scientific department had recently been established there, with John P. Norton as professor of agriculture and Benjamin Silliman, jr., as professor of chemistry as applied to the arts; and an agricultural chemical laboratory was opened with the college year in 1847. This new department formed the beginning of the Sheffield Scientific School. Professor Brewer entered the institution in 1848, intending to spend the winter "learning to analyze soils and manures," but was induced by Professor Norton to remain for two years, taking the regular course then being established.

In the winter of 1850–51 five gentlemen from Buffalo took steps toward the establishment of an agricultural school, the Oakwood Agricultural Institute, at Lancaster, a small village near Buffalo. The school was founded on 200 shares of stock subscribed by these men, who hoped after it had been brought into successful operation to turn it over to the State as a nucleus for a state agricultural college—an institution which many were then advocating. Professor Brewer was employed to take charge of the agricultural department of this new agricultural school, and just before the school opened was placed in charge of it as principal. The school opened early in April, 1851, using the buildings on the farm of Judge Theodotus Burrell, who was the originator and chief promoter of the scheme. About a dozen boys, 14 to 17 years of age, attended until the school closed in the late fall. Professor Brewer spent the winter in giving public lectures for the school on elementary and agricultural chemistry. A disastrous fire in Buffalo that winter so financially crippled the three main supporters of the school that it never opened its doors again.

In 1852 Professor Brewer became connected with Ovid College, an institution in central New York, which had been placed in charge of Rev. Amos Brown with the understanding that he was to introduce instruction in agricultural science, and that the trustees were to provide by subscription the salary of one teacher who was to give instruction in the school in chemistry, agricultural chemistry, and botany, and was to deliver lectures on these and kindred subjects to which the subscribers and their families were to be admitted free of charge. Professor Brewer fulfilled this mission from 1852 to 1858, with the exception of two years spent in Europe; and after teaching chemistry and geology in a number of institutions he went to the Sheffield Scientific School in 1864 as professor of agriculture. This chair he occupied until 1903, when he retired as professor emeritus.

Professor Brewer's career was an unusually active and varied one. Aside from his teaching he held many public positions. He was connected with the geological survey of California, the topographical survey of Connecticut, and the scientific survey of the Philippine Islands in 1903, and he had charge of the department of cereal production in the Tenth Census.

He was a prolific writer on a quite wide range of subjects centering in agriculture, especially historical surveys, the breeding of animals, and the geology of soils. For many years after the organization of the Connecticut State Experiment Station he served as its secretary and treasurer. He was active in connection with the state board of agriculture, and from 1892 to 1909 was president of the Connecticut board of health. He was an active and honored member of many learned societies, at whose meetings he had until recently been a conspicuous figure.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Small encyclopedic dictionary of agricultural chemistry, M. Passon (*Kleines Handwörterbuch der Agrikulturchemie. Leipsic, 1910, pp. IV+415, figs. 305*).—According to the preface this volume is to serve the purpose of ready reference, particularly in experiment stations where a large library is lacking. Notable features in the work are the descriptions of the various chemical methods, and data relating to animal physiology and nutrition and the various feeding stuffs.

Electrolytic reduction of nitric acid, H. E. Patten (*Trans. Amer. Electrochem. Soc., 12 (1907), pp. 325–398, figs. 9*).—According to earlier investigations, in reducing nitric acid with a platinum cathode hydroxylamin is obtained along with nitrogen gas and ammonia. No nitrate is produced. The effect of the cathode material on the yield of ammonia has been investigated, but little attention hitherto paid to cathode polarization. The author, in the laboratory of the Bureau of Soils of this Department, studied the conditions accompanying the various yields of ammonia and of hydroxylamin. The initial electrode single potentials were noted, and measurements repeated throughout the electrolysis. The effect on the yield of different conditions was determined, such as the concentration; the use of a copper cathode with a porous diaphragm and lead anode in dilute sulphuric acid; current density; temperature; the presence of copper sulphate; and the use of different cathode materials. The reducibility of hydroxylamin at the copper cathode and the reduction of nitrate with a copper cathode and platinum anode were determined.

The author concludes from his experiments that an increase in the concentration of the acid increases the yield of ammonia and decreases the hydroxylamin, using a copper cathode in dilute sulphuric acid. An increase of current density decreases the ammonia yield with a copper cathode, but increases it with a platinum cathode. The effect of temperature on the yield of ammonia and hydroxylamin is slight. The ammonia yield is increased by the continued deposition of copper at the cathode, whether smooth or spongy, or amalgamated. A low cathode discharge accompanies a high yield of ammonia, as does also a low-current density. Nitrogen, either free or as oxids, is given off at both the copper cathode and platinum anode. The reduction of nitric acid to ammonia at a copper cathode probably involves the formation of hydroxylamin as an intermediate stage. The electrolysis of sodium nitrate at the copper cathode in a sulphuric acid solution reduces all the nitrogen to a form which is not oxidized by potassium permanganate.

The electrolytic reduction of nitric acid, II, III, H. E. Patten and W. J. McCaughey (*Trans. Amer. Electrochem. Soc., 15 (1909), pp. 535–557, figs. 5; 17 (1910), pp. 377–390, figs. 4*).—In a second paper continuing the above work, the action of oxygen liberated at a platinum anode upon ammonium sulphate in a sulphuric acid solution was studied, and also the reduction of potassium ni-

trate in a sulphuric acid solution in the presence of copper sulphate at a copper cathode. Very comprehensive analytical data were obtained for the solution and for the gases at the anode and cathode at a number of intervals during electrolysis.

The authors conclude that ammonium sulphate in a sulphuric acid solution is oxidized at a platinum anode, nitrogen gas being liberated; that hydroxylamin is found as an intermediate step to ammonia in the electrolysis of nitrate in sulphuric acid with copper sulphate; that nitrogen is liberated at the cathode and at the platinum anode; and that nitrogen undergoing either oxidation or reduction probably goes through the several intermediate stages, if not all, which exist between the initial and final state of oxidation. They have defined the electrical, chemical, and physical conditions under which these changes take place.

In the third paper, the authors study particularly the reduction of hydroxylamin in a sulphuric acid solution at a copper cathode with copper sulphate present, and the oxidation of hydroxylamin at a platinum anode. The conditions of the experiments and single potential discharge measurements are given.

It was found that hydroxylamin may be reduced to ammonia; that nitrogen is liberated at both the anode and cathode, at the anode at a fairly constant rate, ammonia being left in solution, and at the cathode rapidly at first and in such quantity as to suggest the formation of hydrazin as an intermediate step and its subsequent oxidation to hydroxylamin, then giving free nitrogen and as electrolysis proceeds the yield of free nitrogen decreasing. The same high initial evolution of nitrogen is met in the electrolysis of nitrate under the same conditions, and suggests that here, too, the hydroxylamin formed may be reduced to a lower stage of oxidation, such as hydrazin.

The complexity of the humus extract of soils, E. C. Shorey (*Abs. in Science, n. ser., 31 (1910), No. 807, p. 960*).—"A summary of the work of the Division of Fertility Investigations of the Bureau of Soils on soil organic matter. The author announced the isolation by him of 23 organic compounds from soils. Seventeen of these have been identified and 8 types of compounds are represented."

The availability of soil phosphates, W. P. Kelley (*Jour. Indus. and Engin. Chem., 2 (1910), No. 6, pp. 277-280*).—From Hawaiian soils the author was able to show that the neutralization coefficient obtained with fifth-normal nitric and hydrochloric acid bore a direct relation to the availability of the soil phosphates. He further investigated Hawaiian air-dry soils containing large amounts of iron and alumina in combination with large amounts of phosphates (in which combination they would not be readily available for plant growth), with particular regard to the solubility of the phosphates in fifth-normal hydrochloric acid and 1 per cent sodium hydrate. The results show that the fifth-normal hydrochloric acid is of value in determining the phosphate deficiencies in soils of very different types, but that the strength of acid generally employed is not sufficient for highly ferruginous soils.

A method of determining the cellulose-decomposing power of the soil, H. R. Christensen (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 2, pp. 356-359*).—The sample to be examined, corresponding to 50 gm. of dried soil, is placed in a 300 cc. Erlenmeyer flask so that it loosely covers about three-fourths of the bottom. Distilled water is now carefully added with a pipette until the soil is nearly saturated. Two small pieces of ash-free filter paper, 30 mm. long and 5 mm. wide, are next placed in the flask and pressed down with a glass rod so as to touch the soil. According to the author's experience with about 50 different soil samples, after a period varying from a few days to several weeks

the decomposition of the filter paper will commence and will be completed in 9 to 93 days. The rate of decomposition is scored according to a scale ranging from zero to 4. This method is recommended in preference to that of Remy (E. S. R., 15, p. 859) for the quantitative determination of the bacterial activity in soils.

The formation of gluconic acid by the olive-tubercle organism and the function of oxidation in some micro-organisms, C. L. ALSBERG (*Proc. Soc. Expt. Biol. and Med., 6 (1909), No. 3, p. 83; Reprint, p. 1*).—"The olive-tubercle organism (*Bacterium savastanoi*), recently described by E. F. Smith (E. S. R., 20, p. 249), when grown in the presence of glucose and an excess of calcium carbonate converts the greater part of the glucose into calcium gluconate. The amount of energy liberated thereby is exceedingly great in comparison to the weight of the organisms. This is to be explained by the fact that the energy requirements of micro-organisms are very much greater than those of higher forms, partly because of the disproportion between the body surface and the body volume of micro-organisms, and partly because micro-organisms exist in a medium which is an excellent conductor of heat."

New method for extracting a phosphatid from plants, A. CONTARDI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 18 (1909), I, No. 2, pp. 64–67; abs. in Chem. Abs., 4 (1910), No. 12, p. 1619*).—In this work finely powdered rice hulls were treated with 2 parts of a 0.2 to 0.3 per cent hydrochloric acid solution, and the liquid then pressed out, heated at a point lower than the boiling point, and neutralized with magnesium oxid. The precipitate thus formed, which is voluminous, is treated with hydrochloric acid on the water bath (a certain amount of the precipitate remains undissolved). The phosphatid (phytin) is deposited slowly in a crystalline form from the filtrate. The yield from 200 kg. of raw material was 10 kg.

The chemistry of barley spelts, K. GEYS (*Ztschr. Gesam. Brauw., 33 (1910), No. 28, pp. 347–349*).—The ether extract of barley spelts yielded a crude fat which had a dark green color and a melting point lying between 45 and 47° C. This with the aid of hot alcohol was separated into a wax and a fat. The wax after repeated crystallization was found to have the following constants: Melting point 68° C., specific gravity 0.977 at 15° C., acid number 21, ester number 58, and saponification number 79. The fat, which was soluble in cold alcohol, had a melting point of from 18 to 19° C., specific gravity from 0.926 to 0.928, iodin number 65, and saponification number 192. Tannic acid could not be isolated from the alcoholic extracts, but in both the alcoholic and ethereal extracts phosphorus could be detected.

From a watery hydrochloric acid solution a phosphorous compound could be isolated, which the author regards as identical with phytin. Analysis and hydrolysis seemed to prove this, and it is assumed from the work that without a doubt this organic phosphorous compound is hydrolyzed by enzyms in an aqueous solution.

About the nonnitrogenous extracts in feeding stuffs, F. SCURTI (*Staz. Sper. Agr. Ital., 43 (1910), No. 1, pp. 5–32*).—The author investigated the nitrogen-free extract substances which constitute 46.38 per cent of sweet clover (*Hedysarum coronarium*) in order to determine their feeding value. The importance of these substances for feeding is pointed out, and the author divides them into 3 groups: (1) Consisting partly of monosaccharids having 5 to 6 atoms of carbon and partly of disaccharids; (2) the anhydrids of sugars formed by the condensation of the various monosaccharids but not including glucose; and (3) those bodies which are of an acid nature and which are probably derived from the carbohydrates. One hundred parts of dry substance on

analysis yielded glucose, levulose, and arabinose 7.42 per cent, saccharose 2.93 per cent, galactan, araban, etc., soluble in 0.06 per cent NaOH, 3.73 per cent, free organic acids 0.67 per cent, compounds of an acid nature, as salts, 8.43 per cent, and galactan, araban, etc., insoluble in alkali but hydrolizable by dilute sulphuric acid (by difference), 23.2 per cent.

On the heat coagulation of proteins, HARRIET CHICK and C. J. MARTIN (*Jour. Physiol., 40 (1910), No. 5, pp. 404–430, figs. 7*).—"The process of 'heat coagulation' has been studied with solutions of crystallized hemoglobin and crystallized egg albumin. The complete solubility of both proteids after exposure to dry heat at high temperatures (110 to 130° C.) indicates that 'heat coagulation' of protein solutions is not a pure temperature effect, but a reaction between water and protein. In the case of solutions of hemoglobin the rate of coagulation at any moment is proportional to the concentration of residual hemoglobin, i. e., it is a reaction of the first order. Coagulation of solutions of egg albumin crystals is also an orderly time process, but the rate decreases more rapidly as coagulation proceeds than can be accounted for by the decrease in concentration of uncoagulated protein. The explanation of this increased complexity is attributed to want of homogeneity in the composition of egg albumin crystals, and to the changing conditions due to the absorption of free acid by the coagulum as formed.

"The conclusion of Osborne that egg albumin crystals as prepared by Hopkin's method consist of salts of protein with the acids used in their preparation is confirmed. In the case of 1 per cent solutions of egg albumin, twice recrystallized from ammonium sulphate solution, the combined acid was equal to 0.0004 equivalents per gram of protein and the proportion of acid free was 0.7 per cent of the total (0.0000251 N). On addition of alkali to the original solution most was employed in decomposition of the acid protein salts, and diminution of the free acid was very gradual. . . .

"The effect of acid upon coagulation rate is considerable. The addition to a solution of egg albumin crystals of 4 cc. tenth-normal alkali per gram protein (i. e., the amount necessary to neutralize) reduced the reaction rate to one-sixtieth. The influence of acid in accelerating the coagulation rate of a neutral solution of egg albumin is at first relatively small; with each successive addition of acid its influence becomes disproportionately greater. The mean coagulation rate of egg albumin is not directly proportional to the hydrogen ion concentration. The velocity of the reaction increases at first more slowly and subsequently more quickly than the hydrogen ion content. It is possible, however, that hydrogen ion concentration may be a factor in determining reaction rate. As, however, most of the acid added combines to form salts, it may be that the whole or part of its effect upon reaction rate is due to such salts reacting with water more rapidly than protein itself and the more acid salts more rapidly than the less acid salts. The free acid in a solution of egg albumin crystals diminishes and even disappears as coagulation proceeds. The quantity of free acid fixed by the coagulation of a definite quantity of protein is at first nearly proportional to the concentration of free acid; as this concentration increases, the amount fixed falls more and more short of proportionality. The curve suggests that the phenomenon is one of absorption by the coagulated particles, as protein already coagulated and washed absorbs free acid from solutions in which it is suspended.

"Coagulation of both proteins is influenced by temperature in accordance with the law of Arrhenius or some similar logarithmic law. The temperature coefficient is exceedingly high, viz, 1.91 per degree centigrade for egg albumin and 1.3 per degree for hemoglobin."

Determining the quantity of monoamino acids yielded by proteins when hydrolyzed with acids, T. B. OSBORNE and D. B. JONES (*Amer. Jour. Physiol., 26 (1910), No. 2, pp. 212–228*).—The results of modifications of the usual methods of analyzing proteins are reported. The object of the modifications was to obtain a more nearly quantitative method of determining the monoamino acids, or a larger proportion of the still unknown substances among the products of hydrolysis. Zein was the proteid used in the study.

Investigations in regard to the practicability of utilizing anaphylaxis for differentiating various proteids, UHLENHUTH and HAENDEL (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 4 (1910), No. 6, pp. 761–816*).—The anaphylaxis reaction whether passive or active is not applicable to the differentiation of related blood types. The reaction, however, may be of value to substantiate the findings of the precipitation tests with certain proteins or in instances where (for technical reasons or where denaturized protein is in question) it is inconvenient to apply the complement binding reaction or the precipitation test.

Concerning our method of nitrogen estimation, E. A. MITSCHERLICH (*Landw. Vers. Stat., 72 (1910), No. 5–6, pp. 459–464*).—A reply to Zeller's criticism (E. S. R., 22, p. 609).

A source of error in estimating ammonia, E. BARRAL (*Bul. Soc. Chim. France, 4. ser., 7 (1910), No. 1, pp. 8, 9; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 568, II, p. 155*).—When using Schloessing's method in the determination of nitrogen as ammonia it was found that new block-tin condensers absorbed much ammonia, and accurate results were obtained only after they had been in use for a certain length of time. Tests with granulated tin showed only a very slight absorption of ammonia, and from this the author concluded that the error was probably due to the presence of grease or tin oxids in the new tubes.

The gravimetric determination of the phosphates, A. H. MAUDE (*Chem. News, 101 (1910), No. 2635, p. 241; abs. in Chem. Ztg., 34 (1910), No. 69, Repert., p. 273*).—Woy's method (E. S. R., 14, p. 1042; 15, p. 122) is recommended instead of the magnesium-pyrophosphate method on account of its rapidity of execution and more accurate results. The precipitate obtained by double precipitation with ammonium molybdate in the presence of ammonium nitrate and in a nitric acid solution is collected in a Gooch crucible, placed in a nickel crucible containing some asbestos, and heated at a red heat for 20 minutes. The weight of the blue-black mass obtained, multiplied by 0.039467 (log 2.59623), equals the weight of phosphoric acid (P_2O_5).

The exact determination of sulphur and of barium in the presence of alkali salts, I. K. PHELPS (*Abs. in Science, n. ser., 31 (1910), No. 807, p. 960*).—"By precipitating with $BaCl_2$ in a hot, neutral solution the contamination of $BaSO_4$ with foreign negative ions may be almost completely avoided and the precipitate contaminated with such positive ions as K, Na or NH_4 converted into pure $BaSO_4$ by treatment with H_2SO_4, evaporation, and extraction of the alkali sulplate with water. In determining sulphur this alkali sulphate is converted into $BaSO_4$ by addition of the water extract to the mother liquor of the first precipitate. This second precipitate of $BaSO_4$ is added to the first and the process repeated. In determining Ba the water extracts are rejected."

Some improved methods of dairy chemistry analysis (*Wisconsin Sta. Research Bul. 10, pp. 107–125*).—This contains three papers, previously noted from other sources, as follows: (1) A volumetric method for the estimation of casein in cow's milk, by E. B. Hart (E. S. R., 21, p. 613); (2) The quantitative estimation of lactic acid in Cheddar cheese, by S. K. Suzuki and E. B. Hart (E. S. R., 22, p. 414); and (3) The relation of different acids to the precipitation of casein

and to the solubility of cheese curds in salt solutions, by J. L. Sammis and E. B. Hart (E. S. R., 21, p. 177).

Moisture determination in cheese with the Soxhlet oven, O. VON SOBBE (*Milch Ztg., 39 (1910), No. 23, pp. 268, 269*).—The sand method is less accurate and less rapid than, and not so easy to manipulate as, the method which employs a covered dish alone for estimating the water in cheese. See a previous note (E. S. R., 22, p. 414).

Determination of casein in cheese, TRILLAT and SAUTON (*Rev. Soc. Sci. Hyg. Aliment., 5 (1908), No. 5, pp. 794–797; abs. in Chem. Abs., 4 (1910), No. 11, p. 1506*).—Macerate 2 gm. of cheese in 10 cc. of hot water and gradually add 50 cc. of water containing 1 to 2 drops of ammonia. Boil for 5 minutes, add 0.5 cc. of formaldehyde, boil again for 3 minutes, and allow to rest for 5 minutes. Then precipitate the casein with 5 drops of pure acetic acid, allow the precipitate to settle, collect on a weighed filter paper, extract with acetone, dry at from 75 to 80° C., and weigh. In the original article results of analyses of cheeses are given, the increase in the secondary caseins and the decrease in the primary caseins during the aging process being shown.

A new method for estimating albuminoids in milk, TRILLAT and SAUTON (*Rev. Soc. Sci. Hyg. Aliment., 5 (1908), No. 5, pp. 798–803; abs. in Chem. Abs., 4 (1910), No. 11, p. 1506*) —The same as the above method for cheese, with the exception that 5 cc. of milk are diluted to 25 cc., then boiled and 5 drops of formaldehyde added, and the precipitation made with 5 cc. of a 1 per cent solution of pure acetic acid.

Biological differentiation of milk and milk proteids, F. KOLLMEYER (*Ztschr. Biol., 54 (1910), No. 2–3, pp. 64–90*).—These tests were conducted with the milk of the buffalo, cow, ass, and woman.

From the results it appears that a close relation exists between the precipitin and complement binding reaction in the differentiation of milk proteids of the various animal species. Casein, albumin, and globulin have a very definite action on the hemolytic system, producing a deviation of the complement. Certain proteids of milk are biologically identical with those contained in the blood of the same animal species. Colostral milks contain proteids of hematogenous origin and to a greater extent than ordinary milk. With the aid of a lactoserum boiled milk can be detected with the complement binding reaction, but on the other hand, an antiserum can be prepared from boiled milk which yields a complement reaction with both raw and boiled milk.

A new sal method for estimating fat in milk, O. WENDLER (*Milch Ztg., 39 (1910), No. 20, pp. 230–232, figs. 4*).—This is a new fat estimating method in which a neutral substance is substituted for the sulphuric acid or alkali. The apparatus employed in this method is shown.

Butter moisture tests, H. E. ROSS (*New York Cornell Sta. Bul. 281, pp. 401–413*).—The author found that when preparing the sample for moisture estimation it is better to stir the sample while cooling, instead of shaking it as recommended by the Association of Official Agricultural Chemists.

After describing the chemical gravimetric method (E. S. R., 19 p. 506), the Gray method (E. S. R., 18, p. 710), the Irish method (E. S. R., 20, p. 209), and the Farrington method (E. S. R., 19, p. 708), results of comparative tests between these methods and one designated as the Cornell method are reported and discussed. The Gray method showed the greatest diversity from the gravimetric method, 0.515 per cent, and the Cornell method showed the least, 0.075 per cent. The Irish and Farrington tests were about alike, varying respectively 0.258 and 0.268 per cent from the gravimetric method.

The Cornell test is made as follows: After preparing the sample and balancing it in a dry aluminum cup it is placed on the asbestos board of a stand which

has been heated for 3 minutes previously with an alcohol lamp. The butter fat is heated and during the process the aluminum pan is shaken at intervals in order to break up the layer of casein on the surface of the butter. The appearance of a slight pungent odor is used as a guide for terminating the heating. A recession of the foam also takes place at this point. The butter is then cooled (covering it during this period with a piece of paper) and placed on a specially devised moisture balance, which is described. The scale on the balance gives its readings in percentages and fractions thereof. The test is considered very easy to operate and the apparatus is reasonably cheap and durable. The scale can be used for work in the Babcock test.

Antipyrin for estimating the iodin number of fats and essential oils, F. BORDE (*Bul. Sci. Pharmacol., 16 (1909), No. 11, pp. 654–656; abs. in Ztschr. Riech u. Geschmackst., 2 (1910), No. 8, pp. 92, 93*).—In each of two 100 cc. bottles (which may be stoppered) place 15 to 20 cc. of the essential oil and add 10 cc. of pure alcohol and 10 cc. of freshly prepared iodin solution (5 gm. in 100 cc. 90 per cent alcohol), the titer of which has been obtained against an antipyrin solution which contains exactly 1.88 gm. of pure antipyrin in 100 cc. of 50 per cent alcohol. To each flask then add 10 cc. of a 6 per cent alcoholic solution of corrosive sublimate (80 per cent alcohol), shake, and allow to stand for 4 hours in a dark place. After this interval titrate back with antipyrin solution any unused iodin which may be present. One cc. of antipyrin solution is equivalent to 0.0254 gm. of iodin.

Examination of candelilla wax, R. F. HARE and A. P. BJERREGAARD (*Jour. Indus. and Engin. Chem., 2 (1910), No. 5, pp. 203–205*).—The results of an examination of a sample of candelilla wax, a wax which coats the Mexican candelilla plant (*Euphorbia antisyphilitica*), prepared and purified by the authors and compared with carnauba, bee, and Chinese insect wax, are reported.

Nitrogen estimation in feeding stuffs by utilizing different amounts, O. ENGELS (*Landw. Vers. Stat., 72 (1910), No. 5–6, pp. 407–412*).—Using various amounts of substance for the nitrogen determination does not always yield the same results Parallel determinations with 1, 2.5, and 5 gm., respectively, with rape, sesame, palm and coconut cakes, peanut gleanings, linseed, linseed cake meal, brewers' grains, malt sprouts, etc., were made and it is seen from the results that the best results were obtained when from 2.5 to 5 gm. of material was used for the analysis and the least satisfactory when 1 gm. was used.

Examination of phosphatic feed lime, O. KELLNER (*Landw. Vers. Stat., 72 (1910), No. 5–6, pp. 357–365*).—Cooperative tests amongst the German experiment stations show that the short method, previously described (E. S. R., 22, p. 211), while yielding lower results than Petermann's method is more accurate.

The determination of nitrogen in the feces, I. K. PHELPS (*Abs. in Science, n. ser., 31 (1910), No. 807, p. 960*).—"The difficulties of loss of nitrogen by standing, of obtaining a uniform sample of the heterogeneous material, and of separating the hair from the fecal matter when dogs are the subject of study are overcome by preservation of the feces under alcohol, filtration, dehydration of the solid material with ether and treatment of the solid residue and alcohol-ether filtrate separately. The solid residue is freed from hair by sifting and nitrogen determined in the usual way. The alcohol-ether filtrate is sampled and the nitrogen determined according to Kjeldahl, using the precaution to allow the alcohol-ether mixture to flow from a dropping funnel into the sulphuric acid heated and maintained at a temperature of 140 to 160°. Thus the large mass of the alcohol is converted into ethyl ether and excessive carbonization avoided and, at the same time, the acid kept of such concentration that all volatile nitrogen substances are held."

The testing of parchment paper in regard to its utility for packing butter, A. BURR and A. WOLFF (*Milchw. Zentbl., 6 (1910), No. 6, pp. 241-264, fig. 1*).—The results are given of biological and chemical investigations of parchment papers, two of which were of a sort which had contained butter infected with mold.

The most common kinds of mold found were *Penicillium glaucum* and an unidentified mold; less often, Mucor, Aspergillus, and yeasts. Papers which contained the most sugar were the most infected with mold, but notwithstanding this the authors found that other factors such as the salt content of butter had a great influence on the vegetation, and particularly on the kind of fungus; Mucor did not thrive in the butter wrapping tests. Stagnant and moist air are also factors. With starch-glycerin parchment papers it was found that with well-worked butters no fungus generally develops.

The result of the chemical investigations showed that the sugar content with 26 papers was between 0 and 25.78 per cent, and averaged 9.37 per cent. The authors state that the sugar content of a good paper should not be over 8 per cent, and that for water soluble material not over 10 per cent. The water content was found to be between 7.13 and 10.31 per cent. The average paper was neutral to litmus. The ash content fluctuated between 0.34 and 17.1 per cent, with an average of 4.59 per cent. According to the authors, only paper with 4 per cent ash should be allowed for butter wrapping. Lead was detected in only 4 cases. The highest amount found was 0.024 per cent. Iron was mostly only found in traces, but in 2 cases it was 0.011 and 0.009 per cent, respectively.

Fehling's solution, B. HERSTEIN (*Jour. Amer. Chem. Soc., 32 (1910), No. 6, pp. 779-784*).—A contribution to the history of chemical reagents.

Report of the agricultural-chemical and seed control station at Graz, 1909. E. HOTTER (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 4, pp. 454-466*).—A report of the activities of the station for 1909, with a statement of the number of samples examined, these including foods, beverages, fruits, seeds, and technical substances such as coal, salt, and tartaric acid.

Report of the royal agricultural-chemical experiment station at Schärding, 1909, F. HANUSCH (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 4, pp. 487-501*).—The results of the analyses of dairy products and soils, and a statement as to the number of samples examined during the year 1909 are reported.

Report of the chemical control station and seed control institution at Trondhjem for 1909, E. SOLBERG (*Ber. Stat. Kem. Kontrolstat. og Frökontrolanst. Trondhjem 1909, pp. 43*).—This is the report by the chemist of the results of the analyses and examination of feeding stuffs, fertilizers, soil, foods, and seeds.

Report of the royal agricultural-chemical experiment station at Vienna, 1909, F. W. DAFERT (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 4, pp. 167-181*).—This is the report of the activities of this institution during the year 1909, with a description of the work of the various members of the staff.

METEOROLOGY—WATER.

Meteorology, E. KLEINSCHMIDT (*Jahrb. Naturw., 25 (1909-10), pp. 120-140*).—This chapter reviews recent progress in observations and investigations on temperature conditions in free atmosphere, temperature inversion in the upper atmosphere, the relation between seasonal weather types at different places on the earth, the value of aerological observations for weather forecasting and aviation, the use of wireless telegraphy in weather service, the meteorological conditions in the north polar region, the condensation of atmospheric moisture by nitrous gases, meteorological phenomena as a cause of earth-

quakes, atmospheric electricity, and magnetic disturbances. Brief reference is also made to the establishment of a meteorological observatory on Teneriffe, and to the preparation of meteorological globes.

Records of the seasons, prices of agricultural produce, and phenomena observed in the British Isles, T. H. Baker (*London,* [*1910*], *pp. VII+360; rev. in Agr. Gaz.* [*London*], *72* (*1910*), *No. 1908, p. 78*).—This book compiles the available information on this subject for England during the period from 750 B. C. to A. D. 1882.

The meteorological service of Canada, R. F. Stupart (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 3* (*1909*), *pp. CXLI–CXLV*).—A brief account is given of this service, which includes weather forecasting, climatology, seismology, terrestrial magnetism, solar research, and a time service. It is stated that the weather charts and forecasts are based upon "information obtained by telegraph from 36 stations in Canada and 64 stations in the United States, also three stations in Newfoundland, and from Bermuda. . . . During the year 1908, 1,561 storm warnings were issued to Canadian ports, and of these 90 per cent were verified." From these data "means are computed and some approach to satisfactory normal values are now available for nearly all portions of the Dominion."

Monthly Weather Review (*Mo. Weather Rev., 38* (*1910*), *No. 6, pp. 829–990, figs. 16, charts 33*).—This number contains the usual climatological summaries, weather forecasts and warnings for June, 1910, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts. There are also special papers on The Waterpower Resources of Colorado, with Special Reference to Stream Flow, by W. B. Freeman; Snowfall at Summit, Cal. (illus.), by A. G. McAdie; Avalanches in the Cascades and Northern Rocky Mountains during Winter of 1909–10 (illus.), by E. A. Beals; The Catchment of Snowfall by Means of Large Snow Bins and Towers (illus.), by F. H. Bigelow; and The Temperature Conditions of Boston, Mass. (illus.), by A. H. Palmer.

Climatic records for 1909 (*Alaska Stas. Rpt. 1909, pp. 72–82*).—Tabular summaries are given of the reports of the volunteer weather observers of the Weather Bureau on temperature, precipitation, and general weather conditions in Alaska during the year.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. Ostrander and R. N Hallowell (*Massachusetts Sta. Met. Buls. 259, 260, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during July and August, 1910. The data are briefly discussed in general notes on the weather of each month.

Evaporation from free water surfaces, A. G. Smith (*Proc. Iowa Acad. Sci., 16* (*1909*), *pp. 185–188*).—Observations made with pans floated upon the water in a river and embedded in the soil on the bank of the river at Iowa City showed a uniformly higher rate of evaporation from the river pan than from the land pan, the ratio being about 100 to 90.

Water: Its origin and use, W. Coles-Finch (*New York, 1909, pp. XVI+483, pls. 108*).—This is not a scientific treatise, but a popular discussion of the subject. The subjects treated in the different chapters are heat, atmosphere, clouds, rain, water, forms of water, snow, ice, glaciers, springs, rivers, waterfalls, lakes, ocean and sea, mountains and volcanoes, chalk, denudation, how to obtain water, use, abuse, and waste of water, and lessons from nature.

Chemical and biological survey of the waters of Illinois, E. Bartow et al. (*Univ. Ill. Bul., 7* (*1909*), *No. 2, pp. 204, figs. 5*).—This is the report of the Illi-

nois State Water Survey for the year ended December 31, 1908, and includes a brief account of the work during that year, with a summary by years of analyses made since the survey was established.

It also contains articles on the determination of nitrates by reduction with aluminum, incrustation in the discharge pipe at the filtration plant at Quincy, Ill., current methods of sanitary water analysis, farm water supplies, hardness of Illinois municipal water supplies, interpretation of results of water analyses, and municipal water supplies of the State.

The results of examinations of a number of farm water supplies indicate that water from shallow dug wells is very apt to be of poor quality, and it is stated that wherever "it is possible to obtain a satisfactory water by means of driven or bored wells, such wells are much to be preferred to the dug wells." Where it is necessary to depend upon dug wells for the supply it is suggested "that the earth be excavated for 4 ft. outside of the regular casing, that a coating of water-proofed Portland cement be placed over this casing, and that the bottom of this excavation, which should be at least 4 ft. deep, be covered with several inches of water-proofed Portland cement, having a raised portion at the outer edge. This will serve to divert the surface water away from the well, and it may be led to a distance through a tile drain. The whole arrangement will prevent surface water that has not passed through at least 4 ft. of earth gaining access to the water-bearing strata. Bacteria that would otherwise gain access to the well will be filtered out.

Some features of Iowa ground waters, II, W. S. HENDRIXSON (*Proc. Iowa Acad. Sci., 16 (1909), pp. 135–142*).—The fact is emphasized in this article that Iowa waters are as a rule hard. A method of softening based upon the use of milk-of-lime and sodium carbonate, which has been found to be effective in most cases, is described, as well as simple forms of apparatus needed in the softening process. See also a previous note (E. S. R., 20, p. 712).

Salton sea water, A. E. VINSON and W. H. ROSS (*Arizona Sta. Rpt. 1909, pp. 589, 590*).—An analysis made in 1909 is compared with similar analyses made in 1907 and 1908 (E. S. R., 21, p. 17). The variations in composition shown by these analyses indicate that there was a precipitation of calcium carbonate and sulphate during 1909 and that there was a marked increase in the quantity of iron and aluminum.

Water supply in relation to small holdings, C. H. J. CLAYTON (*Jour. Bd. Agr. [London], 17 (1910), No. 4, pp. 289–297*).—The sources of supply considered in this article are permanent ponds, artificial ponds, pools, streams, wells, and rain waters. Estimates are given of the cost of supplying water for small holdings under different conditions.

Pond fertilizing, KUHNERT (*Fischerei Ztg., 12 (1909), No. 44, pp. 701–705; abs. in Wasser u. Abwasser, 2 (1910), No 10, p. 438*).—A plan of fertilizer experiments is given and the conducting of such experiments in connection with feeding experiments is suggested as the proper means of determining the best method of procedure.

The question of pond fertilizing, RADE (*Fischerei Ztg., 12 (1909), No. 41, p. 660; abs. in Wasser u. Abwasser, 2 (1910), No. 10, p. 438*).—The author holds that it is unprofitable to depend entirely upon feeding to increase the product of fish, and recommends fertilizing of ponds.

Pond fertilizing, T. SCHULZE (*Fischerei Ztg., 12 (1909), No. 36, pp. 566, 567; abs. in Wasser u. Abwasser, 2. (1910), No. 10, pp. 437, 438*).—In this article the author takes the position that it is more economical to buy food for the fish than to attempt to grow it by fertilizing the ponds.

Pond fertilizing, J. D. WIEBEN (*Fischerei Ztg., 12 (1909), No. 38, p. 608; abs. in Wasser u. Abwasser, 2 (1910), No. 10, p. 438*).—This article discusses

Schulze's views, referred to above, and suggests ways in which pond fertilizing may be made profitable.

Purification of water, J. A. BEAUDRY (*Ann. Rpt. Bd. Health Prov. Quebec, 15 (1909), pp. 57–71, figs. 6*).—This paper deals with preliminary filtration, use of submerged sand filters, percolating sand filters, and coagulent filters, ozonization, and sterilization by hypochlorites.

It is stated that the use of calcium hypochlorite for the purification of water was first used on a large scale at Jersey City, N. J., in 1908. The treatment was very successful in freeing the water from organic matter which is destroyed by oxygen and also from harmful forms of bacteria. One lb. of calcium hypochlorite to 200,000 gal. of water, or a little more than 1 gr. to 26 gal. of water, is sufficient to produce the desired effect. The cost of such treatment is about 15 cts. per million gallons of water.

Notes on the practical sterilization of potable waters by means of calcium hypochlorite, J. C. THRESH (*Pub. Health [London], 23 (1910), No. 10, pp. 350, 351*).—This article describes the successful use of calcium hypochlorite in sterilizing the water supply of Nashville, Tenn., Minneapolis, Minn., Montreal, Canada, Harrisburg, Pa., Quincy, Ill., Hartford, Conn., and Johannesberg, South Africa. It is stated that the cost of this method of treatment "is so infinitesimal and the results so certain that no other process is likely to prove anything like so economical, and it is scarcely possible for results to be more satisfactory."

The sterilization of water by chlorin and ozone, G. S. WOODHEAD (*Surveyor, 38 (1910), Nos. 966, pp. 114, 115; 967, pp. 165, 166; Jour. Roy. Sanit. Inst., 31 (1910), No. 8, pp. 281–297*).—The methods described in this article are treatment with small quantities of bleaching powder, ozonization by the Siemens-Halske process, and sterilization by means of ultraviolet rays.

The available processes for the purification of sewage, E. PELLETIER (*Ann. Rpt. Bd. Health Prov. Quebec, 15 (1909), pp. 10–30, figs. 22*).—The processes described include broad irrigation, filtration, precipitation, and biological purification. A successful sewage farm at St. Laurent College, near Montreal, is described. The experience at this farm shows that broad irrigation can be successfully practiced in the winter climate of this region. The author intimates, however, that the efficiency of broad irrigation may be increased by combining it with some preliminary treatment which frees the sewage from undissolved solid matters which clog the beds. The apparatus used in the various processes in quite fully described and illustrated.

Purification of Leicester sewage by sedimentation tanks, single contact beds, and broad irrigation on clay land, E. G. MAWBEY (*Jour. Roy. Sanit. Inst., 31 (1910), No. 6, pp. 177–193, figs. 6*).—It is stated that the system of treatment of sewage at Leicester consists of clarification by sedimentation tanks and single contact beds and final purification by broad irrigation on heavy clay land.

Broad irrigation is practiced upon 1,234 acres, of which 230 acres are in cultivation, 274 acres in rye grass, and 730 acres in old pasture. The surface soil varies from about 6 to 12 in. in depth underlaid by from 2½ to 3½ ft. of yellow clay resting on hard bowlder clay. Efficient purification was secured by dividing the area into separate fields having independent systems of drainage and receiving separate treatment. About 1,000 head of cattle are annually fed on the land, which also supplies a considerable amount of additional forage.

The agricultural use and value of sewage, J. A. VOELCKER (*Surveyor, 38 (1910), No. 964, pp. 50, 51; Municipal Jour. and Engin., 29 (1910), No. 5, pp. 150, 151*).—This article points out that the agricultural utilization of sewage

is rendered difficult by the water-carriage system of sewage disposal in general use.

The use of large quantities of dilute sewage on land tends to make the soil cold and to retard nitrification. A further difficulty is the tendency of the fatty and soapy matters in the sewage to clog the soil. These difficulties have led to the adoption of processes of removing the suspended and precipitable matter in the form of sludge. The author is of the opinion that the fertilizing value of this sludge has been exaggerated, and that "the manurial value of sewage as it is now generally met with, and whether it be in the form of crude sewage, of sewage deprived of its solid matters, or of sewage sludge, is but very small." The nitrogen in sewage sludge is considered as "not nearly so available as in artificial manures, and richness in nitrogen is not a test of the comparative value of sludges."

On the whole, the author is of the opinion that the agricultural results with sewage are of secondary importance as compared with the need for speedy and effective sewage disposal.

SOILS—FERTILIZERS.

Investigations on the relation of the physical properties of soils to one another and to mechanical analysis, A. FRANKAU (*Untersuchungen über die Beziehungen der physikalischen Bodeneigenschaften zueinander und zur mechanischen Bodenanalyse. Diss. K. Tech. Hochschule München, 1909, pp. 46; rev. in Zentbl. Agr. Chem., 39 (1910), No. 6, pp. 359, 360*).—This is a review of a dissertation dealing with investigations on water capacity, permeability, cohesion, hygroscopicity, heat generated on moistening, and other physical properties, as well as mechanical soil analysis, in their interrelations on quartz sand, calcareous sand, humus sand, loam sand, marl, loam, and clay. The author concludes that, in general, there was a definite relation between the physical properties of the sands and sandy soils, the loam and the clay, and the mechanical analysis as made by the Kühn and Schöne methods. There was, however, no such relation in the case of the humus sand and the marls because both humus and lime have a specific influence upon the physical properties of soils. The reviewer questions whether the conclusions drawn by the author are borne out by the data which he reports.

On shrinkage of mud ("gyttja") and peat on drying, E. HAGLUND (*Svenska Mosskulturför. Tidskr., 24 (1910), No. 1, pp. 1–6*).—A method for determining the percentage shrinkage on air-drying of soils rich in organic matter is described, and the results obtained with 22 different soil samples are given.

The nature and importance of soil maps, C. EBERHART (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 4–5, pp. 193–211*).—This article discusses the kind of data which should be included in soil maps and their preparation and use.

Soils of Nova Scotia, M. CUMMING (*Ann. Rpt. Sec. Agr. Nova Scotia, 1909, pt. 2, pp. 3–10, map 1*).—It is stated that no thorough survey of the soils of Nova Scotia has been made, but that arrangements had been completed for such a survey to begin in the summer of 1910. This article deals with general observations, describing the geological formations from which the soils are derived and the principal classes of soils which occur.

Agrologic study of the soils of Brittany, L. FOURTON and F. GANDON (*Étude Agrologique des Sols de Bretagne. Rennes, 1909, pp. 23; rev. in Bul. Soc. Nat. Agr. France, 70 (1910), No. 1, pp. 164–167*).—The soils of Brittany are of very diverse origin, but as a rule are poor in lime and phosphoric acid. The 68 analyses reported show that while certain of the soils derived from gneiss,

granite, mica-schists, and feldspathic rocks are well supplied with potash, some of those derived from granulite and schists are insufficiently supplied with this constituent. The soils are as a rule benefited by potash fertilizers, and the systematic use of such fertilizers is considered an essential factor in agricultural progress in the region.

The pakihi soils of Westland, B. C. ASTON (*Jour. New Zeal. Dept. Agr., 1 (1910), No. 1, pp. 22–27, figs. 3*).—These soils, which occur in large areas in Westland, New Zealand, consist as a rule of retentive and compact surface soils overlying sand and a bowlder or cement bottom. Iron hardpan is frequently present. The soils are wet and acid and covered with swamp plants.

Analyses of several samples of the soils indicate that they are very deficient in available phosphoric acid and potash, as well as in lime and magnesia. The total nitrogen, however, is high. Pot experiments with the soils indicated that they were especially in need of lime. Drainage and liming with the use of phosphatic and potash fertilizers is therefore recommended as the best means of improving these soils.

The formation and decomposition of humus in cultivated soils, B. HEINZE (*Landw. Mitt. Prov. Sachsen. u. Nachbarstaat. Halle, 1909, pp. 145–146; abs. in Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 25, pp. 682, 683*).—It is stated that when the necessary organic matter is present in the soil, fungi, bacteria, algæ, lichens, and mosses all cooperate in changing it into humus.

The formation of the humus is more or less independent of the air, as certain anaerobic bacteria decompose organic matter, causing a loss of hydrogen and oxygen and a concentration of carbon and thus producing the dark brown color characteristic of humus. Certain hyphal fungi, as *Cladothrix odorifera, Streptothrix chromogena,* and Trichoderma aid in the decomposition of the organic matter, even when the soil has an acid reaction.

After the humus is formed, other bacteria, such as Azotobacter, commence to decompose it. The addition of stable manure aids materially, as it seems to contain, or act as a carrier for, many of the humus-fermenting bacteria, the humus acting as a source of carbon to the bacteria, especially the nitrifying species.

The biological absorption of methan and the distribution of methan organisms, I. GIGLIOLI and G. MASONI (*Staz. Sper. Agr. Ital., 42 (1909), No. 9, pp. 589–608; abs. in Rev. Gén. Chim., 13 (1910), No. 3, p. 78; Chem. Zentbl., 1910, I, No. 4, p. 294*).—In experiments on the absorption of methan in the presence of oxygen by the methan bacteria of Kaserer and of Söhngen, light was found to exercise no special influence, but a high temperature was found to be favorable, the optimum being about 30° C., although many of the bacteria were active at other temperatures. These micro-organisms are less numerous in the upper layers of the soil than in the deeper portions. They were also found in the bed of streams, in sewer deposits, and in stable manure.

By the absorption and partial transformation of the methan into fixed organic material, these micro-organisms are constantly adding to the fertility of the soil.

Experiments on ammonia and nitrate formation in soils, J. G. LIPMAN and P. E. BROWN (*Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 20–24, pp. 590–632*).—The authors give the results of a large number of experiments on ammonification and nitrification in soils and culture solutions under various conditions and with different animal fertilizers, including a number of facts bearing a more general relation to these processes.

Experiments were undertaken and data as to methods used and results obtained are given on the following points: The bacteriological relations as affected by the addition of dextrose and sodium citrate to the soil; ammonifica-

tion of nitrogenous material in fertile soil and sand, including ammonia production in the soil from different amounts of peptone, from dried blood, and from varying amounts of peptone, dried blood, and cotton-seed meal in varying quantities of soil both with and without a constant bacterial content; ammonia production from peptone and dried blood in constant quantities of soil with a varying bacterial content; the chemical and bacteriological factors in the ammonification and nitrification of nitrogenous materials in the soil; the effects of soluble and insoluble carbohydrates, such as dextrose, starch, and filter paper, on ammonia formation in soils and culture solutions; ammonia formation by *Bacillus mycoides* as affected by the presence of dextrose; comparative tests on the ammonification and nitrification of nitrogenous materials; nitrate formation as affected by soil volume; and the effect of additions of nitrates on the accumulation of nitrates in the soil.

It seems that the carbon-nitrogen ratio is of moment in the rate of ammonification of nitrogenous materials, and that the modification of this ratio by soluble carbohydrates or by other soluble carbon compounds may lead to changes in the numbers and species of the micro-organisms in the soil or culture solutions and a consequent depressed or intensified ammonification depending on the character of the nitrogenous fertilizers.

The relative availability of nitrogenous materials as shown by nitrate formation depends to a considerable extent on their distribution, or the ratio of the soil volume to that of the substance to be nitrified; that is to say, a nitrogenous fertilizer that is evenly distributed in the soil and scattered through a large amount of it will undergo ammonification and nitrification more rapidly and more uniformly than a similar material not properly distributed.

Periodicity in the accumulation of nitrates in the soil may be due to the temporary prominence of species especially capable of transforming large amounts of nitrate into protein nitrogen, as well as to a more rapid increase of various decay organisms and their intense utilization of nitrates for the building of their bodies.

The decomposition of cyanamids through the action of fungi, H. KAPPEN (*Centbl. Bakt.* [*etc.*], *2. Abt., 26 (1910), No. 20-24, pp. 633-643*).—In a series of experiments with fungi to determine their ability to decompose cyanamid, five fungi were found to possess this power, a Cladosporium, *Penicillium brevicaule*, a green Penicillium, a rose-colored fungus, and *Stysanus stemonitis.*

Of these, the Cladosporium and the green Penicillium were able to thrive in a ½ per cent solution of the cyanamid and to decompose it, while the other three were unable to grow in a solution of cyanamid greater than 1 per cent.

From the nature of the decomposition products it is claimed that the enzym of the cyanamid decomposition is not identical with urease, and also that ecto-enzyms play no part in the decomposition. The experiments also indicated that the growth of micro-organisms in a lime nitrogen solution is impossible as long as the lime content is sufficiently high.

The rôle that fungi play in the decomposition of lime nitrogen in cultivated soils can not be definitely settled until the ability of soil bacteria to decompose cyanamids is further tested.

Excessive fixation of nitrogen in some alkaline soils of Colorado, W. P. HEADDEN (*Proc. Soc. Prom. Agr. Sci., 30 (1909), pp. 62-69*).—This is a brief account of investigations which have already been noted (E. S. R., 23, p. 221).

Experiments with nitric acid on alkaline soils, R. S. SYMMONDS (*Agr. Gaz. N. S. Wales, 21 (1910), No. 3, pp. 257-266, figs. 11*).—The experiments here reported conclude a series of field tests in the Coonamble District of New South Wales, in which nitric acid at the rate of 600 lbs. per acre was mixed with artesian well water and sprinkled on the soil with a view to correcting its alka-

line condition. The results show that the yields were greatly increased by this treatment and indicate that the method is sound in principle. The author suggests the feasibility of applying Schönherr's process for the electrical production of nitric acid (E. S. R., 22, p. 127) for supplying the nitric acid required, the hydraulic power of the artesian flow being used to generate the electrical energy necessary and the nitric acid being mixed with the artesian water as it flows on the land.

"There should be no great technical difficulty in applying this method of producing nitric acid to our alkaline artesian waters, which are in an ideal condition to absorb the gases. The waters contain the necessary carbonate of soda free of cost; the water is hot, which would assist the chemical change, and the costly process of concentration is quite unnecessary, as the nitrate could flow out with the water on the land."

Injurious substances in the soil, F. B. Guthrie (*Agr. Gaz. N. S. Wales, 21 (1910), No. 5, pp. 434–441*).—Among the causes of infertility discussed in this article are sourness, presence of protoxid of iron and pyrites, alkalinity, excess of salt, manganese, magnesia, and toxic substances secreted by plants, excessive concentration of soil-water, calcium chlorid, alum, deficiency of essential elements of plant food, and presence of organisms which destroy nitrogen-forming bacteria.

Sterilization of soils, W. Laidlaw and C. A. Price (*Jour. Dept. Agr. Victoria, 8 (1910), No. 6, pp. 365–368, figs. 2*).—The work of other investigators on this subject is briefly reviewed, and theories as to the cause of increased productiveness following sterilization are discussed. An effective plant for the sterilization of soil for the purpose of securing a pure seed bed is described.

Concerning the action of pyrogallol on unproductive soil, H. J. Wheeler, B. L. Hartwell, and F. R. Pember (*Proc. Soc. Prom. Agr. Sci., 30 (1909), pp. 43–54*).—In the field and pot experiments upon an infertile Rhode Island soil here reported, it was found that the pyrogallol as used in experiments by Whitney and Cameron (E. S. R., 16, p. 650), produced little or no effect.

"Lime, as in previous experiments on soil in this and other sections of the State, was found to be a splendid soil ameliorant, yet neither lime nor pyrogallol, nor even the two combined, was capable of rendering the economical production of barley possible unless supplemented by chemical fertilizers containing one or more of the usual so-called essential elements.

"Pyrogallol and sumac leaves, both immediately and subsequently, failed to accomplish the results produced by a mixture of nitrate of soda, muriate of potash, acid phosphate and lime.

"These results and those secured in earlier experiments with similar soil at the Rhode Island Station throw additional doubt upon the wisdom of reasoning from the growth of seedling plants in solutions or from those grown by the paraffined wire-basket method, as to what will take place in a given soil under usual cultural conditions, and show that where possible all speculations and theories should be subjected to the actual test of the field."

Lime and legume inoculation, K. F. Kellerman and T. R. Robinson (*Science, n. ser., 32 (1910), No. 813, pp. 159, 160*).—In experiments in which magnesium carbonate and calcium carbonate were applied in quantities varying from 0.25 to 2 per cent to a sandy loam soil containing a rather high percentage of magnesia it was found that the addition of magnesium carbonate in amounts exceeding 0.25 per cent was positively inhibitive to nitrifying action, while the calcium carbonate was favorable up to 2 per cent. These results indicate that the lime-magnesia ratio "apparently exerts an effect upon nitrifying bacteria analogous to its effect upon some of the higher plants."

Inoculation experiments with nitrobacterine, nitragin, and lupine soil for blue lupines on undecomposed white moorland, H. VON FEILITZEN (*Svenska Mosskulturför. Tidskr., 24 (1910), No. 3, pp. 263–271, figs. 5*).—The addition of bacteria through inoculation has been found necessary for a normal development of legumes on the newly-broken white moor soils at Flahult. Soils from a field where legumes have been grown have always proved effective whether the same or a quite different leguminous crop had been grown thereon. Nitragin proved less certain and less effective for inoculation of white moor soils than inoculated soil, and the cultures of nitrobacterine experimented with proved worthless for this purpose.

Ratio of phosphate, nitrate, and potassium on absorption and growth, O. SCHREINER and J. J. SKINNER (*Bot. Gaz., 50 (1910), No. 1, pp. 1–30, figs. 9*).—"In this study the growth relationships and concentration differences were observed between solution cultures in which the phosphate, nitrate, and potash varied from single constituents to mixtures of two and three in all possible ratios in 10 per cent stages.

"The better growth occurred when all these nutrient elements were present, and was best in those mixtures which contained between 10 and 30 per cent phosphate, between 30 and 60 per cent nitrate, and between 30 and 60 per cent potash. The growth in the solutions containing all three constituents was much greater than in solutions containing two constituents, the solutions containing the single constituent giving the least growth.

"The concentration differences noticed in the solutions were also very striking, the greater reduction in concentration occurring where the greatest growth occurred.

"The change in the ratios of the solutions and the ratios of the materials that were removed from the solutions showed that where the greatest growth occurred, as above outlined, the solutions suffered the least change in ratio, although the greatest change in concentration occurred.

"The more the ratios in these solutions differed from the ratios in which the greatest growth occurred, the more were the solutions altered in the course of the experiment, the tendency in all cases seeming to be for the plant to remove from any and all of these solutions the material in the ratio which normally existed where greatest growth occurred. This did not actually occur in all cases, owing to the unbalanced condition of some of the solutions.

"The results show that the higher the amount of any one constituent present in the solution, the more does the culture growing in that solution take up of this constituent, although it does not seem able to use this additional amount economically.

"In the very early periods the ratio of phosphate absorption is low and the potash absorption high, although in final growth the greater response is obtained with nitrate, indicating relatively low phosphate requirement and high potash requirement of the seedling plant."

Farmyard manure, M. CUMMING (*Ann. Rpt. Sec. Agr. Nova Scotia, 1909, pt. 2, pp. 53–72*).—This article deals with the composition, value, and use of manure. Particular attention is given to methods of handling the manure to prevent losses.

Losses of nitrogen from farm manure by using peat, straw, or pine shavings for bedding, H. VON FEILITZEN (*Svenska Mosskulturför. Tidskr., 24 (1910), No. 1, pp. 10–34*).—In experiments with 10 milch cows fed rations of hay, straw, roots, and concentrates, the litter applied per head daily during the different periods was peat 5.11, straw 3.26, and shavings 13.665 kg. (11.24, 7.17, and 30.06 lbs.), respectively. The average amounts of manure produced (exclusive of litter) were, for period 1, 39.3 kg. (86.46 lbs.), and for periods

2 and 3, 39.7 kg. (87.34 lbs.). Chemical analyses showed a loss of nitrogen of 7.1, 19.8, and 11.1 per cent for the respective periods, as the difference between the nitrogen in the feed and litter and that in the milk, manure, and (calculated) increase in body weight during the different periods. The amounts of total and soluble nitrogen in the manure per head daily were as follows: Peat litter, 222.5 and 95.5 gm., respectively, straw litter 190.3 and 77.5 gm., and shavings 204 and 77.3 gm.

The manure produced on the different periods was carefully stored for about 3½ months during the winter and the losses in volume and weight determined as 5.3, 19.9, and 2.6 per cent in volume, and 3.9, 19.1, and 11.2 per cent, for peat, straw, and shavings litter in weight, respectively. The corresponding losses of nitrogen during storage were determined as total nitrogen, 7.4, 20, and 7.5 per cent, and ammoniacal nitrogen, 4.7, 51.3, and 26.6 per cent, respectively. By the application of peat litter in the dairy barn there was a saving at the rate of about 19½ kg. (42.9 lbs.) of soluble nitrogen per head yearly, more than in the case of straw litter, and 12½ kg. (27.5 lbs.) more than in the case of shavings litter.

Fertilizer experiments with the three kinds of manure were inaugurated and will be reported later. Complete data relative to the chemical analyses of the feeds, litter, milk, and manure, and the temperature readings in the manure piles are given.

Investigations on the disinfection of manure by careful packing, H. BOHTZ (*Arb. K. Gsndhtsamt., 33 (1910), No. 2, pp. 313–362; abs. in Chem. Zentbl., 1910, I, No. 10, p. 858*).—It is shown that by careful construction of the manure heap a sufficiently high temperature may be obtained to destroy almost all animal disease organisms. A few of the more resistant forms are not killed, but their activity is greatly reduced. The precautions necessary are thorough moistening, careful mixing of the manure and litter in the proportion of about 2:3, protection from weathering by covering with materials which are poor conductors of heat, and moderately loose packing. The addition of 10 per cent of milk of lime or of superphosphate and kainit did not interfere with the height or duration of the temperature.

The conservation of kraal manure, H. G. MUNDY (*Rhodesian Agr. Jour., 7 (1910), No. 5, pp. 1376–1379*).—The importance of conserving this manure is discussed and methods of constructing kraals and handling the manure to bring this about are described.

The cooperation of micro-organisms in the decomposition of green manures, B. HEINZE (*Landw. Mitt. Prov. Sachsen. u. Nachbarstaat. Halle, 1909, pp. 169, 170; abs. in Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 25, pp. 685, 686*).—Experiments on the decomposition of green manures indicate that the addition to the soil of small quantities of barnyard manure to be plowed under with the green crops will hasten decomposition by furnishing fermenting organisms which immediately act on the green material. At the same time, if small amounts of potash and phosphoric acid are used, they will quicken the fermenting and rotting processes and furnish available food for Azotobacter.

The utilization of peat as a source of nitrogen for plant food, H. D. HASKINS (*Jour. Amer. Peat Soc., 3 (1910), No. 2, pp. 41–46, fig. 1*).—Pot experiments with millet are reported showing that in a comparison of sodium nitrate, ammonium sulphate, calcium cyanamid, blood, cotton-seed meal, and peat, the latter showed the lowest rate of availability of nitrogen. The availability of the nitrogen of the peat was apparently increased by treating the material with acid. The use of peat as a drier and filler in fertilizers is referred to, but a question is raised as to whether this can be legally done under the fertilizer laws of various States.

Nitrate deposits of southern California, F. W. GRAEFF (*Engin. and Min. Jour., 90 (1910), No. 4, p. 173*).—The nitrate-bearing clay hills in Chemehuvis Valley, about 32 miles south of Needles in southern California, are described, and analyses of several samples of the clays showing a content of sodium nitrate varying from 7.2 to 22.6 per cent are reported. The similarity of these deposits to those of Chile is pointed out. The southern California deposits are easier to work than those of Chile and contain in addition to sodium nitrate other nitrates which promise to be of commercial importance.

A new nitrogenous fertilizer derived from the air, MAIZIÈRES (*Engrais, 25 (1910), No. 28, pp. 768–770*).—The process of Haber, utilizing the catalytic action of titanium oxid on a mixture of nitrogen and hydrogen for the production of ammonia, is described and its commercial possibilities discussed.

The fertilizer value of phonolite meal on peat soils, H. VON FEILITZEN (*Svenska Mosskulturfor. Tidskr., 24 (1910), No. 3, pp. 297–300*).—This material (so-called potassium silicate) proved of some value as a potash fertilizer on peat soils, but was greatly inferior to 37 per cent potash salts in its fertilizer effects.

On vivianite as a fertilizer, E. HAGLUND (*Svenska Mosskulturfor. Tidskr., 24 (1910), No. 3, pp. 273–279*).—Analyses of 10 samples of vivianite are given and its value as a phosphatic fertilizer discussed.

Diatomaceous calcium phosphates in Senegal, L. CAYEUX (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 1, pp. 108–110; abs. in Rev. Sci. [Paris], 48 (1910), II, No. 3, pp. 93, 94*).—Phosphate deposits similar to those of Gafsa in Tunis are described.

The use and abuse of lime in agriculture, W. W. ANDREWS (*Ann. Rpt. Sec. Agr. Nova Scotia, 1909, pt. 2, pp. 111–117, pl. 1*).—The importance of using an abundance of humus-forming material in connection with lime is especially emphasized in this article.

The fertilizer action of salt in combination with ammonium sulphate, B. SCHULZE (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 30, pp. 452–458; abs. in Mark Lane Express, 104 (1910), No. 4114, p. 141*).—From a series of field experiments with potatoes, mangolds, wheat, oats, and beets, the conclusion is drawn that the inferiority of ammonium sulphate as compared with sodium nitrate is due in large measure, if not entirely, to the effect of the sodium in the nitrate. The author recommends, therefore, that ammonium sulphate should always be used in combination with an amount of salt sufficient to supply sodium equal to that in an equivalent application of sodium nitrate. A mixture of equal parts of salt and ammonium sulphate is recommended. Salt, however, may be omitted when potash salts containing a considerable amount of common salt are used. The effect of the ammonium sulphate was greatly increased by the addition of salt, even on heavy soils.

The function of manganese as a fertilizer, L. BERNARDINI (*Staz. Sper. Agr. Ital., 43 (1910), No. 3, pp. 217–240*).—The literature of investigations on this subject is briefly reviewed.

Field experiments with fertilizers, A. W. K. DE JONG (*Teysmannia, 21 (1910), 4–5, pp. 291–301*).—Comparative tests on sorghum of potassium chlorid, superphosphate, Thomas slag, ammonium sulphate, and bone meal, singly and combined, are reported. The soil was uneven in character and the results obtained were variable. One fact which was brought out quite clearly was the high efficiency of ammonium sulphate in a very wet season.

Cooperative field trials of the Swedish Moor Culture Society, 1909, A. BAUMAN and H. VON FEILITZEN (*Svenska Mosskulturför. Tidskr., 24 (1910), No. 3, pp. 280–296*).—Seventy-four different trials were conducted, covering experi-

ments with the sanding, claying, and liming of moor soils, fertilizer trials with phosphoric acid and potash fertilizers for meadows, and variety tests of rye, barley, oats, soiling crops, and roots.

Analyses of fertilizers, B. W. KILGORE ET AL. (*Bul. N. C. Dept. Agr., 31 (1910), No. 4, pp. 5–29*).—This bulletin records in the usual form the results of fertilizer inspection in North Carolina during the fall of 1909 and spring of 1910. The analyses reported "show fertilizers to be about as heretofore, and to be, generally, what was claimed for them."

The manufacture of fertilizers in Cairo, H. D. PARODI (*Egypte Contemporaine, 1910, No. 3, pp. 424–431, pl. 1*).—Establishments utilizing sewage and garbage in the manufacture of fertilizers are described, and the growth and profitableness of this business are pointed out.

AGRICULTURAL BOTANY.

[Work in plant physiology], W. B. McCALLUM (*Arizona Sta. Rpt. 1909, pp. 584–586*).—The work reported was for the most part a continuation of studies in tuberization in potatoes and involved investigations of the factors concerned in tuber formation, especially the influence of previous conditions upon seed tubers. The end desired is a means of shortening the time required for the complete development of the tubers, and it has been found that green sprouting assists very materially in accomplishing this.

Other methods have given some promise of successful results, among them stimulating the dormant tubers with substances such as ethyl bromid, carbon tetrachlorid, ammonia, gasoline, ethylene chlorid, and bromin, the best success being obtained with ethyl bromid. Other substances have been found to stimulate the buds, but the range between the point of stimulation and death is so narrow as to render their use impracticable.

Another form of stimulation was found fairly successful. It has been noticed that in very hot weather the potato plants in Arizona run to tops without developing tubers, and under laboratory conditions it was found possible to check the development of excessive top growth with satisfactory results. More practical methods, however, consist in directly stimulating the tubers by the application of certain chemicals. A large number of chemicals were investigated and it was found that manganese chlorid and ethyl ether gave remarkable results. Seed tubers treated with these, while showing no difference in the growth of foliage, exhibited a most pronounced acceleration in the formation of tubers.

The treatment of other plants, especially tomatoes, with a view to increasing their fruitfulness during hot weather, has not met with much success, but spraying with iron sulphate to injure the foliage at a time when the plants were producing rank vegetative growth was found to increase fruitfulness to some extent.

The action of continued galvanic currents on germination, H. MICHEELS (*Acad. Roy. Belg., Bul. Cl. Sci., 1910, No. 1, pp. 51–101, figs. 3*).—A report is given on the effect of a galvanic current on the germination of wheat. The seed were placed to germinate in crystallization glasses with various nutrient solutions and a galvanic current passed through the medium, duplicate lots being kept as checks.

The greatest differences noted in the cultures were in the percentage of germination and the growth of the roots during a period of about 2 weeks. Where marked increases in growth were noticed they were always found in the un-

electrified lots of seed. The galvanic current is believed to have acted upon the solutions, and the seed were influenced in this manner and not directly.

The germination of seeds of parasitic plants, E. HEINRICHER (*Rev. Gén. Bot., 21 (1909), No. 249, pp. 329-334*).—In a previous publication (E. S. R., 7, p. 748) the author gave an account of the germination and structure of the phanerogamic parasite Lathræa, in which it was shown that the seed would not germinate except in contact with its host plant. The author has since continued his studies with this class of plants, particular attention being paid to the holoparasitic and hemiparasitic plants.

In the related genera, Bartschia and Tozzia, the author has found that without the stimulus of the host the former germinates, but not the latter. Tozzia never develops cotyledons underground, but it is 2 or 3 years in its subterranean development, during which time it lives as a holoparasite. When the plant has completed this stage it appears above ground, expands green leaves, flowers, and dies within a few weeks. During this period it is only partially parasitic in its habits.

The action of potassium salts on the formation of saccharose in seeds, G. DE PLATO (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 3 (1909), pp. 195-202; Staz. Sper. Agr. Ital., 43 (1910), No. 1, pp. 97-104*).—As a result of experiments conducted by the author it is claimed that the function of potassium in vegetable nutrition bears an intimate relationship to the formation of carbohydrates, and that to magnesium principally must be assigned the transportation of these carbohydrates and their subsequent accumulation in the seed, while calcium seems to function mainly in the neutralization of the organic acids formed during these nutrition changes.

These seem to constitute the principal factors in the formation of the relatively large amount of saccharose found in the seeds of peas.

On the circulation of water in plants, LECLERC DU SABLON (*Rev. Gén. Bot., 22 (1910), No. 255, pp. 125-136*).—From a review of the literature and his own experiments the author was led to the conclusion that the ascent of sap in plants is due to osmotic properties in the living cells. The transpiration of the leaves and the absorption through the roots tend to produce differences in rates of pressure, but the principal rôle devolves upon the woody cells, which by their osmotic power tend to keep a constant water supply. Transpiration can not be held to cause the movement of water, since plants not transpiring still continue to retain the water pressure in the vessels.

In conclusion the author states that the weight of a column of water occurring in the vessels is supported by the cell walls and is not transmitted through hydrostatic pressure to the cells below. The internal pressure in the vessels is independent of the height and position in reference to the soil.

The effect of some toxic solutions on mitosis, W. W. STOCKBERGER (*Bot. Gaz., 49 (1910), No. 6, pp. 401-429, figs. 7*).—The investigation reported was carried out in order to observe the process of nuclear and cell division under certain definite conditions of physiological experiment with a series of toxic substances. The toxic solutions experimented with were copper sulphate, phenol, and strychnin.

The results indicate that the toxic effect was first felt in the kinoplasm of dividing cells, as shown by the loss of function and subsequent degeneration of the achromatic figure. Large vacuoles arose in the cytoplasm, frequently deforming the achromatic figure and nucleus, and later the cytoplasm was disorganized. The development of the chromatic figure was consequently inhibited, but neither amitosis nor abnormal mitosis was observed. In the controls in distilled water the cytoplasm became vacuolate, some of the nuclei were enlarged, and occasionally the formation of the cell plate was interrupted.

The author calls attention to the fact that judging by its effect on mitosis, as compared with the effect of dilute solutions of copper sulphate, distilled water is itself a toxic solution.

The effects of poisons on the respiration of living and dead plants, as well as on the respiratory enzyms, W. PALLADIN (*Jahrb. Wiss. Bot.* [*Pringsheim*], *47* (*1901*), *No. 4, pp. 431–461*).—The results are given of a series of experiments in which the action of certain poisons (quinin, ether, selenate of soda, arbutin, pyrogallic acid, urethan, and toluol) on etiolated seedlings of *Vicia faba*, on gladiolus and onion bulbs, and on wheat germs was tested.

It was found that poisons exert their influence on the protoplasm, and that as a result of this influence numerous reactions may occur in the living plants which may result either in a stimulation or a weakening of respiration. The action of poisons on the respiration of growing plants is mainly indirect, but on the respiration of dead plants an unmistakably poisonous action is possible. On the respiration of active plants, poisons act not as a stimulant but as a check. The stimulation of respiration by poisons depends on the increased transformation of zymogens to active enzyms. An increased respiration is accompanied by an increased destruction of the enzym, for after the death of the plants the quantities of enzyms in stimulated and controlled portions are equal.

Investigations on the short roots of Sempervivum and the resulting endotrophic mycorrhiza, F. ZACH (*Sitzber. K. Akad. Wiss.* [*Vienna*], *Math. Naturw. Kl., 118* (*1909*), *I, No. 3, pp. 185–200, pl. 3, figs. 4; abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 26* (*1910*), *No. 16–17, p. 490*).—It is claimed that in the cells of the so-called short roots of Sempervivum a species of Hyphomycetes is found in evident symbiotic relations with the roots, thus presenting another instance of endotrophic mycorrhiza.

The constancy of certain physiological characters in the classification of bacteria, H. A. HARDING (*New York State Sta. Tech. Bul. 13, pp. 3–41, figs. 11*).—The author discusses the various efforts made during the last 15 years to find a workable system of classifying bacteria, which finally culminated in the present classification card of the Society of American Bacteriologists, and presents the results of a study of various strains of *Pseudomonas campestris* in regard to the value of the card as a basis for classification of bacteria.

The group number on this card is a numerical expression of the result of 10 physiological reactions, and its value as a basis of classification depends upon the constancy with which the same numerical results are obtained for various strains of a single species. When tested upon 44 strains of *P. campestris*, the same group number gave constant results and did not break the species into smaller groups, and therefore as far as it applies to this species it is regarded as a satisfactory basis for classification.

The limitation of the group number system as now constituted lies in the fact that it does not carry the separation to a group synonomous with the ordinary conception of species. It is claimed that further assistance in classification may be expected from pathogenicity toward plants, indol formation; casein digestion, growth in Uschinsky's and Cohn's solutions, and turbidity in broth.

Studies in pyrophilous fungi, II, F. J. SEAVER and E. D. CLARK (*Mycologia, 2* (*1910*), *No. 3, pp. 109–124, pls. 3*).—In continuation of previous studies (E. S. R., 22, p. 452) the authors give an account of changes brought about by the heating of soils and their relation to the growth of Pyronema and other fungi. Their experiments failed to show the presence of a soluble toxic substance in unheated soil which will retard the growth of Pyronema when applied to heated soil. The heating of soils at high temperatures was found to bring about chemical changes in respect to the extracts obtained from the soil. The

materials rendered available by the heating of the soil serve as nutrients for the fungi, and the distillation of heated soil extract does not remove the properties favorable to the growth of Pyronema.

It was found impossible to render unheated soil favorable to the growth of the fungus by the introduction of the extract of heated soil, and this was apparently due to the fact that the nutrient materials in the extract were rendered insoluble by the action of the unheated soil.

Not only was Pyronema readily grown in the extract from the heated soil, but other fungi as well, fungi of various kinds readily growing in soils subjected to steam or dry heat.

Mycological studies on flax and hemp retting, O. VARGA and J. CSÓKÁS (*Kisérlet. Közlem., 13 (1910), No. 1, pp. 50–52*).—After a summary of the present methods of retting flax and hemp, the author gives the results of experiments on the causes that underly the retting process.

Retting seems to be a fermentation process due to certain anaerobic bacteria dissolving the pectin substances which bind together the cells of the bark parenchyma. These micro-organisms both morphologically and physiologically resemble Störmer's *Plectridium pectinovorum.*

Pure cultures of this Plectridium on sterilized flax stems and in the absence of oxygen produced the normal retting. The water retting of hemp was also found to be due to a similar micro-organism, while the dew retting of hemp seems to be produced by various molds, among which a Cladosporium species is the most frequent.

A study of some of the changes occurring in prunes, STOYKOWITCH and BROCQROUSSEU (*Rev. Gén. Bot., 22 (1910), No. 254, pp. 70–79*).—The authors have made a study of prunes to determine some of the causes for their depreciation. They have found that the principal changes are due to various organisms, among them, yeasts, Monilia, and several species of molds.

A study was made of the different fungi, and the white discoloration, which is very common, is said to be due to a species of yeast, which depreciates the value of the prunes to a considerable extent. This yeast may be killed by heating the prunes to 65° C. during the process of drying. The most serious changes are those produced by the molds, of which *Penicillium glaucum* is one of the most common. This reduces the sugar and acid content by nearly 50 per cent and causes an increase in the nitrogen. Similar, though less extensive, changes are caused by Aspergillus and Rhizopus.

It is claimed that the presence of these molds may be controlled by the rapid reduction of the water in the fresh fruit.

Monascus purpureus in silage, R. E. BUCHANAN (*Mycologia, 2 (1910), No. 3, pp. 99–108, pls. 2, figs. 2*).—During 1909 the author made an examination of molds occurring on silage not properly prepared, such silage having in several instances been considered the cause of the death of horses with symptoms of equine cerebro-spinal meningitis. Cultures were made and a number of molds isolated, among them several species of Penicillium, Aspergillus, Mucor, and in one instance Monascus. In this sample of silage the Monascus was practically the only mold found, and as no record was found of the occurrence of this fungus in America or in silage, considerable attention was given to its morphology and cultural characters.

Several species of Monascus have been described, but the specimens studied seem to correspond in all essential characters with *M. purpureus*, and the organism is tentatively placed with that species. The type of this species is said to be common in eastern Asia, where it is used in the preparation of a food product from rice, but without any poisonous effect so far as known.

The author thinks that this is the typical fungus present in moldy silage which is reported to have killed horses, but its pathological properties have not as yet been determined.

On the chemistry of the higher fungi.—III, The fungus diastases, J. Zellner (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 118 (1909), IIb, No. 1-2, pp. 3-18; abs. in Bot. Centbl., 113 (1910), No. 11, pp. 281, 282*).—This is a continuation of the study (E. S. R., 19, p. 1027) on the chemistry of the higher fungi, with special reference to the presence of fungus diastases and their action on various carbohydrates.

In experiments with decoctions of dried fungus tissues, more than 19 species of wood-inhabiting parasitic and saprophytic fungi were found to contain active amylolytic enzyms which weak solutions of inorganic acids and bases easily rendered inactive, but dilute organic acids accelerated the diastatic processes. This diastatic action occurs at temperatures between 40 and 60° C., 50° being the optimum, while at 70° enzymatic action ceases. Compared to the diastatic power of barley malt, these fungus enzyms are very weak. The products of the enzymatic processes are nearest to the dextrin group, consisting mainly of glucose, but no maltose was found. Other carbohydrates, such as inulin and arabin, were not acted upon.

FIELD CROPS.

David Dickson's and James M. Smith's Farming, edited by G. F. Hunnicutt (*Atlanta, Ga., 1910, rev., pp. 255, pl. 1, figs. 25*).—Discussions and information of a practical nature are given on a wide variety of farm subjects.

Dry farming in West Texas (*Houston, Tex. [1910], pp. 45, figs. 22, map 1*).—This publication presents a number of articles of value to the dry-land farmer. Part of them are from the publications of experiment stations and of this Department, while others are from various periodicals.

[Results of field crops' experiments at the Alaska Stations], C. C. Georgeson et al. (*Alaska Stas. Rpt. 1909, pp. 14-17, 17-19, 20-22, 39, 40, 42-49, 51-62, pls. 5*).—At the Rampart Station, 55 varieties of cereals including winter varieties of wheat and rye and spring varieties of wheat, oats, barley, rye, and emmer matured during the past summer. Ghirka, G. I. No. 1517, Romanow, and Wild Goose spring wheats and 2 varieties of buckwheat failed to mature, but Red Fife from Brandon, Manitoba, produced a crop before killed by frost. Pamir barley, S. P. I. No. 18922, and Yakutsk, G. I. No. 574, proved the earliest varieties grown, maturing in 87 and 88 days respectively, while the Yakutsk oat, G. I. No. 498, matured in 89 days. Manshury proved one of the best barleys. Chittyna, a barley of unknown origin, averaged 45 in. in height and unites most of the qualities desirable in Alaska.

At the Fairbanks Station, the Romanow and a velvet chaff winter wheat matured. When sufficiently protected by snow, winter wheat appeared more likely than spring wheat to succeed in the interior. Winter rye, S. P. I. No. 19556, matured perfectly, but S. P. I. No. 11268 completely winterkilled, while Tennessee winter barley, G. I. No. 386, was partially successful. Pedigree seeds of barley and oats were almost entirely lost through early frosts. Although red, white, and alsike clovers were completely winterkilled at Rampart, alsike survived at Fairbanks. Thirty acres of Banner oats grown for seed and commercial feed oats for hay matured.

Notes are given on the growth made by turnips, mangels, barley, oats, and a considerable number of vegetables at the Sitka Station In a test of 15 varieties of potatoes, Gold Coin, Extra Early Ohio, and Extra Early Triumph gave

the highest yields. Brief progress reports are given of the results of sowings of each of a large number of varieties of small grains and grasses at the Rampart and Fairbanks stations. At the former station, the more notable potato yields were made by the Early Harvest, Garfield, Pat's Choice, Hamilton Early, Red River Ohio, and Burpee Early varieties. A weather record for the year ended September 30, at the Kodiak Station is given. Beach grass was harvested for silage during rainy weather and for hay during dry weather. Sand spurry seeded May 1 at Calsinsky Bay stood 12 to 15 in. high August 15 and was relished by the milch cows. Work at the Rampart Station on clearing the land of moss by burning has been discussed editorially (E. S. R., 23, p. 103).

[The Woburn field experiments], J. A. VOELCKER (*Jour. Roy. Agr. Soc. England, 70 (1909), pp. 362–388*).—The work of 1909 has been continued with little change in plan from that of 1908, previously noted (E. S. R., 23, p. 532). A sunless spring and summer with very continuous rainfall resulted in harvests of grain of very poor quality.

In the continuous wheat growing tests on plats dressed with nitrate of soda only, in amounts supplying 50 and 25 lbs. of ammonia, the crop failed to tiller well and produced very inferior grain with the lowest weight per bushel in the series. The check plat yielded 7¾ bu. per acre while the highest yield, 27.8 bu., followed the application of farmyard manure. Sulphate of ammonia applied with less than 10 cwt. of lime produced a reduced crop or no crop at all. The plat which received a complete fertilizer again showed a yield of 5 bu. per acre less than the plat which also received 1 ton of lime in 1905, while the influence of lime applied in 1897 remained apparent. The use of phosphate proved more necessary than that of potash.

Barley on the same field, also in the thirty-third season of continuous growing, produced yields of 45.4 and 36.9 bu. per acre respectively on the plat fertilized with farmyard manure and a mixture of sulphate of potash and nitrate of soda, while mineral manures alone or with sulphate of ammonia produced markedly lower yields than the unmanured plats. The further applictaion of 2 tons per acre of lime as compared with 1 ton applied in 1905 yielded 30.6 and 28.8 bu. per acre respectively, as compared with 27.8 bu. on a plat which had not received lime since 1897.

On the same field lime was added to swedes in 1909 after wheat in 1908, at the rate of 2 tons per acre, because of the appearance of spurry. The supposed superiority of cotton cake fed on the land or put on in the form of farmyard manure failed to appear in either the sheep-feeding or the bullock-feeding portion of this rotation. In a rotation in which mustard followed barley, the cotton cake plats excelled all others in yield but stood lowest in a rotation of wheat after mustard. In a rotation of barley after swedes, about the same yield was produced when a swede crop had been fed off by sheep on the land as when it had been previously treated with farmyard manure from bullocks.

In a test of 3 Argentine varieties of alfalfa, La Pampa produced the highest yield of green produce per acre in 1908, but the lowest in 1909 when Buenos Aires excelled it with a yield of 2 tons 8¾ cwt. per acre. Canadian seed excelled both American seed and Provence seed in the fourth crop with a yield of 16 tons 18¾ cwt. of green produce per acre. Inoculation with nitro-bacterine applied with the seed and later by sowing with soil, produced negative results, yielding a slight gain with Dutch White clover and a loss with Mammoth White clover. Applications of 2 tons of lump lime or 10 cwt. of ground lime showed a distinct advantage, the heavier application being followed by an increase of 17 bu. per acre in the yield of barley.

Field experiments with magnesia on wheat confirm the observations previously made in pot culture work. The magnesia, applied at rates of 1½, 3, and

6 cwt. per acre, produced grain correspondingly inferior as indicated by milling and baking tests. Soil to which magnesia had been applied appeared darker, moister, and more sticky.

Good results followed the spraying of potatoes with Bordeaux mixture, Woburn paste, and Strawsonite. Cutting off the tops of the plants when the leaves became infected appeared to multiply the yield of sound, merchantable potatoes by 1½ and that of diseased tubers by 3½. One cwt. of sulphate of ammonia was tested as a source of nitrogen in comparison with nitrate of soda, calcium cyanamid, and calcium nitrate supplying equal amounts of nitrogen. On wheat, nitrate of soda and calcium nitrate produced the most immediate results and sulphate of ammonia the slowest. The results with different crops are summarized in the following table:

Yields per acre following nitrogenous top dressings.

Fertilizer.	Wheat.	Barley.	Mangels.		Potatoes.	
	Lbs.	*Lbs.*	*Tons.*	*Cwt.*	*Tons.*	*Cwt.*
Sulphate of ammonia	1,118.0	2,982.5	32	2	15	19
Nitrate of soda	1,336.0	3,001.0	36	16	15	9
Calcium nitrate	1,117.0	3,014.5	40	16	15	6
Calcium cyanamid	1,134.5	2,703.0	37	5	15	7
None	823.5	3,051.0				
Standard dressing only			40	15	14	12

In addition to the nitrogenous fertilizers mentioned in the table all the mangel plats were treated with a standard dressing of 12 tons dung, 3 cwt. superphosphate, 1 cwt. sulphate of potash, and 2 cwt. salt per acre, while the potato plats received the same application except for the omission of salt. Applications of 3 and 6 cwt. of magnesia or carbonate of magnesia and of 6 cwt. of magnesium lime and of 10 cwt. of ground limestone to potatoes in addition to the standard dressing almost invariably produced yields 1 ton or more less than followed the application of the standard dressing alone. The larger the quantity of magnesia applied the more marked was the decrease in yield.

Report of cooperative fertilizer and variety tests, 1909, O. H. LARSEN (*Ber. Landbofor. Virks. Planteavl. Sjælland, 1909, pp. 360*).—The trials here reported were conducted by Danish farmers under the direction of the various county agricultural societies in Zealand. They include 236 fertilizer trials with winter and spring grains, root crops, grasses and soiling crops, 303 field experiments with lime and marl, observations of the residual effects of fertilizers, variety tests with small grains, roots, and legumes, notes on weeds and plant diseases, and on methods and time of sowing grains and root crops.

Under the fertilizer trials were included 36 series of comparisons of Chile and Norway saltpeter, containing 16 and 13.15 per cent of nitrogen, respectively, applied to mangels, sugar beets, ruta-bagas, turnips, potatoes, and small grains. Chile saltpeter proved superior to Norway saltpeter in its fertilizer effect in the case of all crops except ruta-bagas, with which in 8 experiments there was a 30 per cent greater average increase from the Norway saltpeter. In 27 series of trials with mangels the yields from the two fertilizers were approximately equal. The results obtained with mangels verified those of the 3 preceding seasons when this experiment was tried by the agricultural societies, but Norway saltpeter has been applied to ruta-bagas only 1 year.

[Experiments with drought-resistant forage plants], J. J. THORNBER (*Arizona Sta. Rpt. 1909, pp. 575–580*).—These pages outline the range conditions during the year. *Opuntia phæacantha* and *O. mamillata* were discarded from the test of economic cacti because of slow growth and the liability of the latter to destruction by rabbits. The planting of cuttings was continued with 100

plants each of *O. fulgida*, *O. spinosior*, *O. arbuscula*, *O. discata*, *O. linguæformis*, and *Opuntia* sp. Experiments were contained with *Andropogon torreyanus*, *Chloris virgata*, *C. gayana*, and *Sporobolus airoides* in the hope of developing promising forage and hay plants.

[Experiments with sugar beets and cotton], R. W. Clothier (*Arizona Sta. Rpt. 1909, pp. 563, 564*).—A good stand of sugar beets was secured but nearly all were killed by root rot. The plants analyzed varied from 0.5 to 1.75 lbs. in weight, from 13 to 18 per cent of sugar in the juice, and from 77 to 83.3 per cent in purity. All the cotton seed planted was 2 years old, but it produced a perfect stand except in the case of Roger Big Boll. Cook Improved produced a maximum yield of 1,734 lbs. of seed cotton per acre. It required 2.7 hours longer to pick 100 lbs. of Egyptian (Mitafifi) than any other variety.

Report on oat and barley experiments, 1909, R. B. Greig (*Aberdeen and No. of Scot. Col. Agr. Leaflet 10, pp. 6*).—In 1904 a mixture of 5 bu. of Waverley oats with 6 bu. each of Wide Awake, Siberian, and Thousand Dollar varieties was sown. During each succeeding year the produce has given a heavy uniform crop. At 8 centers the Major variety produced the highest average yield of 76 bu. among 6 varieties tested. Among 8 varieties of barley tested at 8 different centers Invincible produced the highest average yield, 47 bu. of dressed grain per acre, as well as a higher yield of straw than most other varieties.

Meadows and pastures, T. F. Hunt (*Pennsylvania Sta. Bul. 101, pp. 3–16, figs. 3*).—This is an address delivered before the Pennsylvania State Board of Agriculture and before the Pennsylvania Live Stock Breeders' Association, and based largely on data noted from other sources (E. S. R., 21, pp. 133, 220; 23, p. 138).

A plat unfertilized for 28 years yielded in 1909, 1,216 lbs. of hay, as compared with 4,496 lbs. following an application of phosphorus and kainit. Little effect followed the application of 320 lbs. land plaster. On other plats 2 tons of quicklime added once in 4 years was compared with 6 tons of manure added once in 2 years. A check plat yielded 1,040 lbs. of hay in 1909 and a total of 11,663 lbs. of all products during 1882–1906. The corresponding figures for the limed plats were 1,880 and 11,632 lbs., for the manured plat 4,008 and 17,383 lbs., and for a plat both limed and manured 5,784 and 18,016 lbs. per acre.

Cooperative experiments—grasses (*Agr. Jour. Cape Good Hope, 36 (1910), No. 6, pp. 675–690*).—These pages report the results of cooperative experiments with grasses, clovers, and alfalfa on a large number of farms.

Canada bluegrass: Its culture and uses, R. A. Oakley (*U. S. Dept. Agr., Farmers' Bul. 402, pp. 20, figs. 7*).—This bulletin describes Canada bluegrass and discusses its uses as a pasture grass, hay, and soil binder for lawns and on scab lands. Suggestions are made for harvesting, thrashing, and cleaning the seed and for obtaining a stand and breaking up old sod.

Suggestions on corn breeding, P. O. Vanatter (*Bul. Univ. Ga., No. 117, pp. 31, figs. 8*).—Four varieties each of western and southern corn averaged, respectively, 52.67 and 63.94 bu. per acre and 56.5 and 88.25 per cent in the germination tests. In the case of 15 plants of Whatley Prolific in which the ears weighed more than the barren stalks the ratio was 1:0.51, while with 4 other plants the ratio was 1:1.37. Similar ratios of the Red Cob variety were 1:0.62 in case of 8 plants and 1:1.95 in case of 12 plants. The fodder is not so good and the grain does not germinate as well in case of the plant in which the weight of grain is less than that of the stalk. Tables show the date of ripening, weight of ear in ounces, weight of stalk at different dates, ratio of ear to stalk, and percentage of germination for 20 stalks each of Whatley Prolific and Marlboro Prolific.

The author gives general directions for seed and plant selection, locating and conducting breeding plats, and suggests an arrangement of the plats to prevent the inbreeding of the corn.

Pedigree seed corn, E. S. BEAVEN (*Jour. Roy. Agr. Soc. England, 70 (1909), pp. 119–139*).—A review and descriptive outline of the work in seed selection and plant breeding in the United States, Sweden, Denmark, Ireland, and Germany are given and suggestions made for the registration of pedigreed seed corn.

The judging of seed maize, J. BURTT-DAVY (*Transvaal Dept. Agr., Farmers' Bul. 79, pp. 16, figs. 2*).—A corn-judging score card is given and the points discussed in full.

July and August work in selecting seed corn, W. A. GRAHAM (*N. C. Dept. Agr. Spec. Bul., 1910, June, Sup., pp. 7, fig. 1*).—This bulletin gives general directions for seed corn selection. The score cards of 11 States are given in parallel columns, and a score card for North Carolina is proposed.

Tenth annual report of the Indiana Corn Growers' Association (*Ann. Rpt. Ind. Corn Growers' Assoc., 10 (1910), pp. 114, figs. 38*).—In addition to information regarding the objects and transactions of the association, articles are presented on improvement of small grains, results of cooperative crop experiments, and other agricultural problems.

Cotton growing in German colonies, M. SCHANZ (*Manchester [1910], pp. 28*).—A report is given of the status of cotton growing in the German colonies, together with a brief general statement of the results of experiments in certain of the colonies.

The culture of the cowpea, B. W. KILGORE ET AL. (*Bul. N. C. Dept. Agr., 31 (1910), No. 6, pp. 70, figs. 15*).—In these experiments at the Iredell Test Farm the soil from the unfertilized plats contained 0.075 per cent nitrogen, 0.041 per cent phosphoric acid, 0.553 per cent potash, and 0.396 per cent lime. Among a large number of plats treated with different fertilizers and fertilizer mixtures the most profitable yields are stated in the following table:

Yield of peas and hay obtained in fertilizer experiments with cowpeas.

Field.	Fertilizer applied per acre.	Period.	Yield per acre.	Cost of fertilizer.	Value of increase over cost of fertilizer.
			Peas, bu.		
C.	46 lbs. 13 per cent blood; 342.8 lbs. 14 per cent acid phosphate; 120 lbs. 20 per cent potash salt	1904–1906	18.70	$4.98	$2.22
C.	23 lbs. 13 per cent blood; 171.4 lbs. 14 per cent acid phosphate; 60 lbs. 20 per cent potash salt; 500 lbs. unslaked lime every fourth year	1904–1907	15.10	3.12	2.38
A.	23 lbs. 13 per cent blood; 514.2 lbs. 14 per cent acid phosphate; 60 lbs. 20 per cent potash salt	1908	14.00	4.89	8.28
A.	23 lbs. 13 per cent blood; 171.4 lbs. 14 per cent acid phosphate; 180 lbs. 20 per cent potash salt	1908	13.83	3.69	6.81
			Hay, lbs.		
C.	69 lbs. 13 per cent blood; 171.4 lbs. 14 per cent acid phosphate; 60 lbs. 20 per cent potash salt	1904–1907	3,195	3.87	7.04
C.	23 lbs. 13 per cent blood; 171.4 lbs. 14 per cent acid phosphate; 60 lbs. 20 per cent potash salt	1904–1906	3,256	2.49	6.33
A.	23 lbs. 13 per cent blood; 514.2 lbs. 14 per cent acid phosphate; 60 lbs. 20 per cent potash salt	1908	3,200	4.89	16.11
A.	46 lbs. 13 per cent blood; 342.8 lbs. 14 per cent acid phosphate; 120 lbs. 20 per cent potash salt	1908	2,900	4.98	13.02

Higher profits were generally obtained in fertilizing for hay production than for peas. The most profitable yields were obtained from the application of from 42 to 70 lbs. of phosphoric acid per acre and its use alone is recommended. The soil does not need potash and tests with lime do not indicate that this

material is needed in the growth of peas. For the production of hay, nitrogen alone, potash alone, and nitrogen and potash combined produced only slight increases in yield and those at an economic loss. Neither nitrogen nor potash when mixed with phosphoric acid produced larger yields than phosphoric acid alone.

In a variety test conducted during the period 1903–1908, the Whittle variety produced the highest average yields of 13.5 bu. per acre, while Iron stood first in yield of hay with 3,872 lbs. per acre, but eighth in yield of peas with 9.9 bu. per acre. In a test of plantings made at the rates of 1, 2, 3, 4, and 6 pks. in drills 3½ ft. apart, the highest yield of hay, 3,000 lbs. per acre, followed the planting of 2 pks., but the highest yield of peas, 8.22 bu., was secured by planting 6 pks. per acre. Full directions are given for production of cowpeas in different types of land in North Carolina and for utilizing the crop.

[Analyses of some Helianthi] (*Bol. Min. Agr., Indus. e Com. [Rome], 9 (1910), Ser. C, No. 2, p. 3*).—Analyses are given of the Jerusalem artichoke, *Helianthus doroicoides*, and *H. decapetalus*.

The manioc, E. LISBÔA (*Lavoura; Bol. Soc. Nac. Agr. [Brazil], 14 (1910), No. 2, pp. 59–69, pls. 4*).—Analyses of the parts of the plants and its products are followed by directions for the production of the crop. A bibliography of French and Spanish works is given.

Ten years' experience with the Swedish Select oat, M. A. CARLETON (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 182, pp. 47, pls. 4, figs. 4*).—A brief history of the introduction of the Swedish Select oat is followed by an account of cooperative tests by experiment stations.

In Wisconsin, 100 farmers reported in 1903 average yields of 44 bu. per acre as compared with 37.5 from other varieties. In 1904, 30 men reported yields of 45 and 40 bu. respectively, while in 1907, 96 reported yields of 27.9 and 24.3 bu. per acre respectively, and in 61 cases the oats were badly rusted. At the experiment station the average yield from Swedish Select during 1899–1908 was 50.8 bu. as compared with an average of all other varieties of 42.3 and an average yield of oats in the State of 33.4 bu. per acre. During 1900–1907, omitting the year 1905, Swedish Select, Big Four, Siberian, and Silver Mine produced average yields of 60.2, 46.3, 45.1, and 45 bu. per acre, respectively. During 1900–1908, Swedish Select, Silver Mine, and Early Gothland averaged 57.9, 44.9, and 43.3 bu. per acre, respectively.

At the North Dakota Station during 1899–1908, omitting 1901 and 1905, the 8-year average yield of Swedish Select was 53.2, the average yield of all other varieties grown at the station 55.7, and the average North Dakota oat yield 28 bu. per acre. At the Montana Station, Swedish Select stood fifth in yield in a test of 6 varieties. Mogheda, American White, American Beauty, and Archangel produced average yields ranging from 106.9 to 109.8 bu. per acre during 1900–1904. At the South Dakota Station, Swedish Select and Tobolsk averaged 43.67 and 35.91 bu. per acre during the period 1899–1908. During 1901–1908, Sixty-Day averaged 59.96 bu. per acre. At the Highmore Substation, Swedish Select and Sixty-Day averaged 44.7 and 40.2 bu. per acre, respectively, during 1903–1909.

At the Washington Station, Swedish Select yielded 55 bu. in 1903, 86 bu. in 1904, and 53 bu. in 1905 as compared with 82.5 and 84 bu. respectively during the last 2 years yielded by its strongest rivals. At the Colorado Station, the yield during 1905–1907 averaged 88.4 bu. as compared with 86.8 for all other varieties. At the Cheyenne Wells substation, the yield in 1900 was 18 bu. per acre.

At the Iowa Station during 1905–1908, Kherson, Silver Mine, Swedish Select, and Sixty-Day averaged 60.2, 56, 50.5, and 48.7 bu. per acre respectively in

a test of 16 varieties. At the Alaska Stations, Swedish Select almost invariably matured either partially or entirely. Only the North Finnish Black "has been constantly more successful than the Swedish Select." The opinions of farmers are stated with the results of former tests in Washington, Idaho, Colorado, Montana, Michigan, South Dakota, New York, and Wisconsin. Tables show the weight per bushel and per thousand grains and percentage of meat in kernel of a number of varieties grown in Wisconsin, Montana, North Dakota, and Kansas, Swedish Select usually standing highest in these respects. Chemical analyses have already been noted from another source (E. S. R., 20, p. 1063). An estimate is given of the value of the introduction of the Swedish Select oat.

Manurial experiment with oats: Humansdorp district, K. M. JOHNSEN (*Agr. Jour. Cape Good Hope, 36 (1910), No. 6, pp. 652–654*).—In a fertilizer test with oats conducted on 3 different farms the greatest profit, £2 3s. 2d., followed the application of 200 lbs. of superphosphate, while a loss followed an application of 100 lbs. of nitrate of soda either with or without 20 lbs. of sulphate of potash.

Potato experiments and studies at University Farm in 1909, A. R. KOHLER (*Minnesota Sta. Bul. 118, pp. 67–141, figs. 7*).—Tables present at length the yields of numerous varieties tested. Notes are given on each variety and a classification of varieties is suggested.

The average gain in favor of new seed stock over that which averaged 4.2 years older was 112.8 bu. per acre. Other experiments indicate that pieces not less than 1 oz. in size should be planted and that this is a primary factor for consideration in planting. Early Ohios harvested July 31 yielded 10.9 bu. per acre. The average daily gain in weight of marketable potatoes secured by digging during the next 30 days was 7.18 bu. per acre. The daily gain near the end of the period was lower as the foliage died. "The quantity of small tubers remained practically uniform throughout the period."

Spraying plats of the Sir Walter Raleigh variety with 25 gal. per acre of a 5–5–50 Bordeaux mixture and 50 gal. at subsequent sprayings resulted in an average gain of 16.8 bu. per acre. This gain, 10.1 per cent, was associated with a gain of 8.3 per cent in condition of foliage. The previous year the percentages were 9.1 and 7.2 respectively. Notes are given on results of spraying with Paris green, commercial arsenate of lead, homemade arsenate of lead, arsenate of soda, and arsenite of soda in amounts ranging from 2 to 6 lbs. per acre. Paris green proved the cheapest and most reliable.

Fertilizer tests with dried blood, acid phosphate, sulphate of potash, and rotted manure indicated that the application of nitrogen or phosphorus alone with or without manure was useless, while potassium with or without manure was beneficial. Partially decomposed manure produced an average gain of 74.2 bu. per acre as compared with yields on the check plats. A complete commercial fertilizer appeared to produce a larger gain when applied with manure than when used alone. The average net profit from applications of 12 tons per acre of manure was $17.52 per acre.

Progress of the beet-sugar industry in the United States in 1909 (*U. S. Dept. Agr. Rpt. 92, pp. 87, figs. 2*).—This consists of 3 parts.

I. *Report of the special agent,* C. F. Saylor (pp. 7–70).—This report, which is similar to those of previous years (E. S. R., 16, p. 43; 17, p. 31; 18, p. 34; 19, p. 32; 20, p. 441; 21, p. 431), outlines briefly the evolution of the beet-sugar industry, gives directions for the production of the crop, and reviews conditions and developments in each of the States having one or more factories. Statistics of the sugar industry and plans for extending the beet-sugar industry in each of the principal beet-growing States are presented and discussed.

II. *Comparative tests of sugar-beet varieties*, J. E. W. Tracy (pp. 71–78).—This report is supplementary to Circular 37 of the Bureau of Plant Industry of this Department, previously noted (E. S. R., 21, p. 733). Tables present the results of variety tests and indicate that Morrison has stood first in yield of roots and of sugar during the entire 6-year period.

III. *The curly-top of beets*, H. B. Shaw (pp. 79–87).—This article is an abstract of Bulletin 181 of the Bureau of Plant Industry of this Department, previously noted (E. S. R., 23, p. 557).

Sugar cane in Porto Rico, D. W. May (*Porto Rico Sta. Bul. 9, Spanish Ed., pp. 7–44, pls. 3*).—A Spanish edition of the bulletin previously noted (E. S. R., 23, p. 237).

Report on turnip manuring experiments, 1909, R. B. Greig (*Aberdeen and No. of Scot. Col. Agr. Leaflet 11, pp. 6*).—When used with 5¾ cwt. of superphosphate and 1½ cwt. of potash manure salts, sulphate of ammonia, calcium cyanamid, nitrate of lime, and nitrate of soda are considered of practically equal value in the production of turnips. In a test showing the effects of omitting in turn potash, phosphoric acid, and nitrogen from a complete fertilizer the check plat averaged during 6 years 8 tons 12 cwt. of turnips per acre. With the complete mixture, ⅝ cwt. sulphate of ammonia, 5¾ cwt. superphosphate, and 1½ cwt. of potash salts, there was an average yield of 19 tons 6 cwt. per acre. The omission of potash apparently decreased the yield by 3 tons, the omission of the phosphate by 8 tons 8 cwt., and the omission of the nitrogen by 2 tons 5 cwt. Ground Belgian phosphate produced an average yield at 9 centers of 2 tons 8 cwt. less than superphosphate, practically the same as ground Algerian phosphate, and more than 1 ton more than ground Florida phosphate when applied with ⅞ cwt. sulphate of ammonia, 1½ cwt. potash salts and dung, but when applied without dung it yielded 2 tons 6 cwt. less than superphosphate, 1 ton 7 cwt. less than Algerian phosphate, and 1 ton 10 cwt. more than Florida phosphate. Six cwt. of basic slag yielded 1 ton 12 cwt. more turnips at 1 center and 17 cwt. more at another than 6 cwt. of superphosphate when both were applied with 1 cwt. each of sulphate of ammonia and potash salts.

A dark brown or black powdery by-product of the distilling industry known as Rothes fertilizer contained 5.11 per cent nitrogen, 5.3 per cent phosphoric acid, and 4.17 per cent potash. An application of 6 cwt. of this fertilizer was followed by a yield of 10 tons 1 cwt. of turnips as compared with 4 tons 17 cwt. on the check plat and 8 tons 4 cwt. after an application of artificial manures containing the same amount of nitrogen, phosphoric acid, and potash.

Wheat in India; its production, varieties, and improvement, A. and G. L. C. Howard (*Calcutta: Govt., 1909, pp. IX+288, pls. 7, figs. 4, maps 7*).—This volume contains general information on the distribution, irrigation, cultivation, harvesting, and marketing of wheat in India, as well as on the soils devoted to it, rotations used, and the commercial phases of wheat production following cultivation. The results of manurial, irrigation, and cultivation experiments and of tests of implements and machines at the Cawnpore, Poona, and other experimental farms of India are presented. Insect pests and diseases are discussed and an account given of the improvement of Indian wheat by the introduction of new varieties, seed selection, and plant breeding, with the results of recent investigations in these lines. The wheats of different provinces are classified, described, and illustrated.

Svalöf Poodle wheat, N. Nilsson-Ehle (*Sveriges Utsädesför. Tidskr., 20 (1910), No. 2, pp. 69–87, pl. 1*).—This article gives a description of a new variety of winter wheat adapted to central Sweden.

Manuring wheat in the Humansdorp district (*Agr. Jour. Cape Good Hope, 36 (1910), No. 6, pp. 647–651*).—In a fertilizer test on wheat conducted at 4

different farms average profits of £1 11s. and £1 6s. 11d. respectively followed applications of 200 lbs. of superphosphate and 200 lbs. of basic slag. The greatest loss followed an application of 100 lbs. of nitrate of soda.

How to grow more and better wheat (*Indiana Sta. Circ. 23, pp. 40, figs. 18*).—This circular gives full directions for wheat production in Indiana. The preparation of the soil, seeding, fertilizing, and harvesting the crop are outlined and directions given for combating diseases and insect pests.

Four noxious weeds, J. BURTT-DAVY (*Transvaal Dept. Agr., Farmers' Bul. 54, pp. 13, figs. 4*).—Burweed, cockle-bur, Mexican poppy, and dodder are described and methods for their control or eradication outlined. The text of the Transvaal law with regard to burweed (*Xanthium spinosum*) is given.

HORTICULTURE.

[Horticultural investigations in Alaska], C. C. GEORGESON ET AL. (*Alaska Stas. Rpt. 1909, pp. 8–14, 32–39, 40–42, 49–51, 65–72, pls. 3*).—This consists of notes on the condition of the varieties of fruits, vegetables, and ornamentals being tested at the Sitka Station, and of vegetables at the Rampart and Fairbanks Stations. Letters are also included from a number of settlers in different parts of Alaska, reporting the results obtained with various seeds distributed for trial.

The winter season of 1908–9 was unusually severe and all of the growth made by the fruit trees in 1908 was more or less winterkilled. At the Sitka Station where most of the fruit investigations are being conducted, results of the experiments with fruit trees have thus far not been very encouraging. Although a number of varieties of apples have been grown to the blooming period they have failed to set fruit. It would appear that if apples are ever to succeed in Alaska they must be developed from hybrids between the native Alaska crab-apples (*Pyrus rivularis*) and other varieties containing crab blood. These latter varieties are proving hardier and more promising than varieties with no crab in them. Such bush fruits as currants, gooseberries, and raspberries are proving fairly successful in the coast region and efforts are being made to produce hardier varieties for the interior. Blackberries and dewberries can not be successfully grown in any part of Alaska.

The hybridization of strawberries (E. S. R., 19, p. 35) has been continued with considerable success. After discarding a number of crosses between cultivated varieties and the wild strawberry of Alaska (*Fragaria chiloensis*) crosses were finally made of the native variety as the pollen-bearing parent with an unnamed cultivated sort obtained from Hollis, Alaska. This variety, which has been named the Hollis, proved hardier at the Sitka Station than other varieties tried. Among more than 2,000 plants obtained from the resulting seed, 1,288 were found that would bloom. These hybrid seedlings, which are being further tested, are much more vigorous than either of the parents. Many of the plants produced fruit as large as or larger than that of the mother variety and in addition they nearly all inherited the very desirable qualities of fine flavor, high aroma, and firmness of berry which characterizes the wild plant.

Illustrations are given of a number of the hybrid types secured.

Horticulture, J. E. COIT (*Arizona Sta. Rpt. 1909, pp. 565–569*).—A summary of horticultural investigations conducted during the year, including the olive-oil work which has been previously reported (E. S. R., 22, p. 735), cultural and variety tests with dates, orchard work, a test of ornamental plants for screens, and inspection of nursery stock.

French gardening, T. SMITH (*London, 1909, pp. XXIX+128, pls. 22, figs. 6, dgm. 1*).—In this book the principles, equipment, and cultural operations employed in the intensive vegetable culture known as French gardening are considered in great detail, including specific directions for growing various crops, marketing, estimates for establishing and maintaining a French garden, a monthly work calendar, garden plans, etc.

The production of vegetable seeds: Sweet corn and garden peas and beans, W. W. TRACY, Sr. (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 184, pp. 39, figs. 3*).—This paper is based upon the author's personal experience in the production of vegetable seeds. General consideration is given to present conditions and practices in vegetable seed growing, together with the details of growing sweet corn, garden peas and beans for seed in quantity and as stock seed.

Orchard soils of the county of Cumberland, H. I. JENSEN (*Agr. Gaz. N. S. Wales, 21 (1910), No. 6, pp. 461–463*).—Analyses of samples of sandstone, shale, and basalt soils collected in the best orange orchards of this county are reported.

The composition of these soils, which have been heavily manured for a number of years, is compared with virgin soils of the same origin. This shows that cultivation and manuring have completely altered both the mechanical and the chemical condition of the sandstone and shale soils. "Originally very different, they have, by working and fertilizing, been brought to the condition of good basalt soils, and original differences in chemical and mechanical composition have been almost eliminated. It is clear from this fact that the ideal virgin soil for citrus fruit is a loose and friable basalt soil, such as would be produced by decomposition of feldspar basalt, in which a sandy or porous texture is maintained by the resistance to weathering of soda feldspar crystals."

The influence of various fertilizers on fruit trees, H. MÜLLER and O. SCHNEIDER (*Landw. Jahrb. Schweiz, 24 (1910), No. 4, pp. 226–234*).—Tabular results for the period from 1906 to 1909, inclusive, are given relative to orchard fertilizer experiments conducted at the Wädenswil station.

The results as a whole indicate that an insufficient quantity of nitrogen diminishes the yield considerably, and may cause a slight chlorosis condition. No definite results were noted as to the use of phosphoric acid. Deficiency of either potash or lime tends to diminish the yield considerably.

Better methods in eastern orcharding, F. C. SEARS (*Ann. Rpt. N. J. Bd. Agr., 37 (1909), pp. 105–121*).—A paper with the discussion following, in which the writer presents the main facts of the orchard situation both East and West, and offers some specific suggestions for raising the standard of the orchard industry in the East.

Native and tropical fruits, H. A. VAN HERMANN (*Ann. Rpt. Cuban Nat. Hort. Soc., 4 (1910), pp. 128–148*).—Popular descriptions are given of a number of native and tropical fruits adapted for culture in Cuba.

Olive culture, G. D'UTRA (*Bol. Agr. [São Paulo], 11. ser., 1910, No. 5, pp. 345–380, figs. 8*).—This is a monograph on the olive, treating of its history, geographic distribution and botany, details of propagation and culture, varieties, harvesting, oil pressing, and diseases and other enemies of the olive.

The olive tree, P. H. CRAM (*Daily Cons. and Trade Rpts. [U. S.], n. ser., 1 (1910), No. 44, pp. 589–591*).—A consular report discussing the varieties of olive trees planted, their characteristics, and the manner of planting, irrigating, pruning, and fertilizing in southern France.

Grape investigations in the Vinifera regions of the United States with reference to resistant stocks, direct producers, and Viniferas, G. C. HUSMANN (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 172, pp. 86, pls. 8, figs. 30, map 1*).—This bulletin is a preliminary report upon the investigations started by the Bureau of Plant Industry in 1902.

A summary is given of the condition of the California viticultural industry at the time when the investigations were begun, including a general discussion of the factors involved in the attempts to reconstruct phylloxera-infested vineyards. The scope and purpose of the investigations are discussed in detail. They include a comprehensive test of resistant varieties of vines to determine their adaptability to the different vineyard soils and climatic conditions, studies of the congeniality of the Vinifera varieties to the different resistant stock varieties, and the behavior of fruiting varieties to determine which are best adapted to different localities. All classes of grapes are also being considered with reference to their resistance to destructive insects and diseases.

Descriptions are given of the 11 experimental vineyards, including soil analyses and climatic records. Fourteen species which have proved sufficiently resistant to merit further testing are described and data are given showing the year of planting in each vineyard of resistant and direct producing varieties, as well as the relative rate of growth of each as noted in the autumn of 1908. Similar data are given for Vinifera varieties grafted on resistant stocks, and for varieties growing on their own roots. The resistant stocks are also grouped according to soil adaptability as indicated by their use in foreign countries.

The experimental vineyards now contain 277 resistant stock varieties and 415 Vinifera varieties of which 271 are grafted on various resistant stocks. The resistant qualities of the varieties are being tested by means of phylloxera inoculation. Detailed records are being kept of the starting, blossoming, yield, and defoliation of all the varieties, the relative rooting qualities of the stocks, specific methods of pruning, training, grafting, etc., and the congeniality of the stocks to the Vinifera varieties. It has already been determined that under like conditions of growth, the sweetness and acidity of the fruit as well as its time of ripening are materially influenced by the congeniality of the graft and stock. Similar ratings of the growth of a variety grafted on various stocks are found to be accompanied by fairly definite percentages of sugar and acid. Progress is reported in the making of varietal descriptions, and the work is being widened in its scope by the distribution of vines and cuttings to collaborators in different parts of the Vinifera region. In the concluding notes the adaptability of different species to different methods of propagation is indicated. Thus far it appears that hybrids between Riparia and Rupestris varieties will prove to be among the stocks best suited for California conditions, the best of them combining in themselves the better qualities of both parents.

Artificial date ripening, A. E. Vinson and W. H. Ross (*Arizona Sta. Rpt. 1909, pp. 590–593*).—A summarized account of work previously noted (E. S. R., 22, p. 703).

The Heeleaka Experimental Station investigations during the seasons of 1905, 1906, and 1907, C. M. Hutchinson (*Indian Tea Assoc. [Pamphlet] 1, 1908, pp. 31, pls. 5*).—This report embraces the results of manuring, pruning, plucking, and cultural experiments secured during the 3 years of the station's existence, as previously reported (E. S. R., 19, p. 648).

The 3 years' results in manurial experiments have led to the following general conclusions: On such light soils as that of the station, oil cake is the most economical manure tried as a means of renovating old tea. A complete fertilizer such as a combination of superphosphate, sulphate of potash, and nitrate of soda can undoubtedly be utilized successfully for the same purpose, although at a higher cost. A complete fertilizer produces a better effect than any of its component elements used alone. The oil cake gave better results when applied in small annual doses than in larger amounts at longer intervals.

The increased yields of leaf produced by the use of green manures are very small when compared with the general manurial treatments, but they are

decisive enough to show the value of such treatment as a means of improving the soil texture and fixing nitrogen. Of two plants previously recommended as green manure crops Dhaincha (*Sesbania cannabina*), and nati-kalai (*Phaseolus mungo*) the former plant is said to grow vigorously in many soils in which the latter makes a very poor crop. At the station the plat on which arahar has been grown for 3 consecutive seasons has shown the most improvement.

The pruning experiments were designed largely to obtain information as to the best methods of light pruning old tea. Cleaning out the bushes, both at the sides and center, including the removal of all weak laterals, appears to be the best means of keeping up the yield of the bushes and of rendering them less liable to such diseases as red rust and thread blight.

The Heeleaka Experimental Station report on investigations during 1908, G. D. Hope (*Indian Tea Assoc. [Pamphlet] 4, 1909, pp. 22, pls. 8*).—A progress report for the year 1908 on the experiments above noted.

At the beginning of 1908 the manurial plats on which mustard oil cake, castor-bean meal, and cattle manure had been used for 3 years were left unfertilized to study the residual effects of these manures. The mustard oil cake showed the best results and the cattle manure the poorest, although the general tendency for all the plats is toward improvement as indicated by the returns from the check plat. The residual effects of the commercial fertilizers do not appear to be so lasting.

Influence of drying on the quality of tea, H. L. Welter (*Bul. Dept. Agr. Indes Néerland., 1910, No. 37, pp. 24*).—The author conducted some initial experiments to determine the influence of the water content in manufactured tea on its quality.

The general conclusion reached is that a water content either too high or too low affects the quality unfavorably. At the completion of the drying process tea should contain at least from 3.5 to 4 per cent of water and preferably from 6 to 7 per cent, allowing for a subsequent reabsorption of water from the air of from 1 to 1.5 per cent. The firing process should be conducted as rapidly as possible and the product cooled down immediately. Tea should not contain more than 9 per cent of water after being fired and cooled down. The importance of carrying on similar investigations on a more extended scale is pointed out.

Sweet peas, H. J. Wright (*London, [1910], pp. 116, pls. 8*).—A popular work on sweet pea culture, discussing also the history and classification of sweet peas, making new varieties, growing sweet peas for various purposes, and enemies and diseases.

A list is given of 50 standard varieties, together with a brief bibliography of sweet peas, and a chapter by T. Stevenson on the culture of these flowers for exhibition purposes.

Pansies, violas and violets, W. Cuthbertson (*London [1910], pp. XI+116, pls. 8, figs. 5*).—A popular work, the successive chapters of which discuss the history and development of the pansy, the history of violas, propagation from seed and cuttings, cultivation of choice flowers for exhibition and other purposes, and varieties.

The work concludes with a calendar of operations.

The book of the rose, A. Foster-Melliar (*London, 1910, 4. ed., pp. XXXVI+356, pls. 55, figs. 6*).—The present edition of this work, which first appeared in 1894, has been brought up to date. The successive chapters deal with history and classification, situation and soil, planning and planting, manures, pruning, stocks, propagation, pests, roses under glass, exhibiting, manners and customs, selections, and calendar of operations.

FORESTRY.

Engelmann spruce in the Rocky Mountains, with special reference to growth, volume, and reproduction, E. R. HODSON and J. H. FOSTER (*U. S. Dept. Agr., Forest Serv. Circ. 170, pp. 23*).—The data presented were collected from the National Forests of Colorado and Utah. The following phases are discussed in detail: Economic importance, distribution and local occurrence, silvical characteristics, reproduction, and management. Tables are given showing the diameter, height, and volume growth of trees of various ages, as well as the progress of reproduction in different types of locality.

It is concluded that Engelmann spruce type is distinctly a protection forest. At least two-thirds of the stand should be reserved for protection purposes and heavy cuttings avoided at all times. In mixtures such as Engelmann spruce with Alpine fir, or with lodgepole pine, fellings should be made in favor of the spruce. In mixtures of Engelmann spruce with Douglas fir, however, the fir should be favored because of its greater economic value.

On northern exposures and flats with abundant surface-soil moisture or with the mineral soil exposed, the spruce reproduction appears to be satisfactory, whereas on dry south exposures Alpine fir commonly forms over 50 per cent of the new growth and not infrequently over 90 per cent. This suggests that the lack of spruce reproduction may be due to seed bed conditions and not to light conditions.

A study of the fundamentals of spruce growing, A. SCHIFFEL (*Centbl. Gesam. Forstw., 36 (1910), No. 7, pp. 291–309, figs. 2*).—Experiments extending over a number of years are reported in detail, in which it was sought to determine the effect of various densities of forest canopy on the best development of spruce trees.

The work thus far indicates that spruce trees should not be planted too thickly. About 2,500 trees per hectare (or 1,000 trees per acre), evenly spaced, would appear to be the maximum number for the best development of saw logs. The diameter accretion is intimately connected with crown development. During the period of greatest wood accretion the length of the crown should not be less than half of the stem length. Any deterioration in the crown length is indicated by a diminution of diameter growth.

Thinnings which are not thorough enough to open up the forest canopy to some extent will not serve to prevent deterioration of crown and stem growth.

Experiments on the use of red beech wood for railroad ties, A. SCHWAPPACH (*Ztschr. Forst u. Jagdw., 42 (1910), No. 7, pp. 427–432*).—The experiments reported cover a period of several years.

The conclusions thus far reached are that healthy white heart beech wood impregnated with creosote tar oil will prove an excellent material for railroad ties, lasting under ordinary conditions for from 20 to 25 years. Sound red heart beech wood may be used if the red heart does not consist of more than 25 per cent of a quarter sawed log, and does not extend into the upper or outer layers of the tie.

Unsatisfactory experiments with beech ties are attributed largely to careless handling and seasoning before the ties are given the preservative treatment.

Beech railroad ties, D. SCHNEIDT (*Österr. Vrtljschr. Forstw., n. ser., 28 (1910), No. 3, pp. 157–183, figs. 11*).—A general review of the experience gained in France, Germany, and Austria relative to the impregnation of beech wood with wood preservatives. The author is of the opinion that the successful results thus far obtained should be sufficient to overcome the former prejudice against beech ties which under proper treatment have proved to be both durable and cheap.

The bamboo (Dendrocalamus strictus) forests of the Ganges Division, U. P., B. A. REBSCH (*Indian Forester, 36 (1910), No. 4, pp. 202–221, pl. 1*).—The chief object of the present article is to draw attention and invite discussion on the management and working of bamboo forests in a locality where the demand is great and the working consequently intense. The past history of these forests is reviewed, and the gradual evolution of the present method of working and changes in system of management are discussed.

The forests and forest flora of the Colony of the Cape of Good Hope, T. R. SIM (*Aberdeen, 1907, pp. 361, pls. 160, map 1*).—The purpose of the present work is to bring together the available information relative to the forest flora of Cape Colony.

Part 1 treats of the forests themselves relative to their area, value, and economic composition, factors affecting forest growth and distribution of species, economic value of Cape timbers, protection and exploitation, artificial afforesting, history of Cape forestry, and species reserved under the forest act. Part 2 contains a synoptical index to indigenous ligneous genera, an artificial key to the genera, and systematic descriptions of species. Part 3 is made up of botanical drawings of the species.

On the useful timber trees of German southwest Africa, C. POGGE (*Ztschr. Forst u. Jagdw., 42 (1910), No. 7, pp. 400–426, pls. 5*).—Descriptions are given of a large number of timber trees growing in the central and southern portions of southwest Africa. The subject matter is based upon the available literature, together with the author's personal observations.

A new resin cup, T. S. WOOLSEY, Jr. (*Indian Forester, 36 (1910), No. 8, pp. 450–452, pl. 1*).—A new resin cup is briefly described and pictured.

The cup, which appears to be of some considerable size, is made of glass and tightly covered with a metal cap which is also fastened snugly over the holes in the tree. Two holes from $\frac{3}{4}$ to 1 in. in diameter are bored into the sap wood of the tree at a tangent with the heart wood. The holes start from the same point and extend in depth about 5 in. according to the diameter of the tree.

The grade of gum produced is superior to that secured in unprotected cups, since there is no evaporation and no dirt of any kind can get into the sap.

The anatomy of compressed woods, P. JACCARD (*Separate from Mitt. Schweiz. Centralanst. Forstl. Versuchsw., 10 (1910), No. 1, pp. 53–101, pls. 6, figs. 33*).—This study, which was conducted in the laboratory of the Swiss polytechnic school, consists chiefly of an investigation into the anatomical causes of rupture in wood.

Samples of wood of a number of coniferous and hardwood species were submitted to mechanical compression and studied relative to the direction of the lines of rupture caused by the compression, the relation between the distribution of the medullary rays and the direction of the lines of rupture, and the anatomical character of the zone of rupture. For the sake of comparing mechanical compression with natural pressure, the structures of naturally plicated spruce wood, axillary wood, and of callous formed wood were also studied.

The experiments are described in detail, and the studies illustrated by numerous plates.

Abstract of report on the present status of timber tests in the Forest Service, United States Department of Agriculture, W. K. HATT (*Cong. Internat. Assoc. Testing Materials [Proc.], 5 (1909), Pt. I, Sect. XVII, pp. 10*).—This paper as presented before the Fifth Congress of the International Association for Testing Materials, Copenhagen, 1909, consists of the conclusions derived from the various studies conducted by the Forest Service of this De-

partment relative to the strength of wood and which have been noted from time to time.

Consumption of firewood in the United States, A. H. Pierson (*U. S. Dept. Agr., Forest Serv. Circ. 181, pp. 7, fig. 1*).—Tabular estimates are given and discussed showing the estimated consumption of firewood by various classes of consumers and the estimated quantity and value by States in 1908 of the firewood used on the farms, in large and small cities, towns, and in mineral operations. These estimates are based upon inquiries sent to more than 48,000 county and crop correspondents of the Bureau of Statistics of this Department, reports by special agents of the Census Bureau in the larger cities, and information furnished by mining operators.

The total quantity consumed is given as 86,000,000 cords with an average value of $2.91 per cord. A little more than 20,000,000,000 cu. ft. of wood in all forms is used in the United States each year, of which 7,000,000,000 cu. ft. is firewood. About 81 per cent of the firewood is consumed on farms.

DISEASES OF PLANTS.

The diseases of cultivated plants and their treatment, H. Faes (*Les Maladies des Plantes Cultivées et leur Traitement. Paris and Lausanne, 1909, pp. 256, figs. 147*).—In this work accounts are given of the principal injuries to which cultivated plants are subject. The order of treatment is as follows: Troubles due to physiological causes, insect pests, fungus diseases, and the attack of phanerogamic parasites, the host plants being grouped into vineyard, orchard, garden, and field crops, and forest trees. The general plan of the work is to describe the pests in terms that are readily comprehended by agriculturists, while at the same time sufficient detail and scientific accuracy is given to make the book a guide for students in vegetable pathology. It is published under the auspices of the Association of Professors of the Agricultural Schools of Switzerland.

Symptoms of diseases in plants, F. D. Heald (*Bul. Univ. Texas, Sci. Ser. No. 14, pp. 63, figs. 62*).—The main part of this paper deals with the symptoms of plant diseases produced by fungi and bacteria, brief mention being made of several parasitic phanerogams.

The principal symptoms of diseases in plants are given as discolorations of tissues, leaf perforations, wilting, necrosis, atrophy, hypertrophy, mummification, change of position, destruction of organs, excrescences, malformation, exudations, and rotting. In addition to a general discussion of the symptoms of diseases common to orchard, field, and garden crops, the author illustrates by photographs the gross appearances of a large number of these diseases.

Bacteria in their relation to plant pathology, M. C. Potter (*Brit. Mycol. Soc. Trans., 3 (1909), pt. 3, pp. 150-168, pl. 1*).—In a presidential address before the British Mycological Society, the author gives a review of a number of plant diseases which are attributed to bacteria, concluding the address with a bibliography of the literature relating to bacterial diseases of plants.

The influence of parasitic fungi on the development of the host plant, Dittrich (*Jahresber. Schles. Gesell. Vaterländ. Cult., 1909, II, p. 32; abs. in Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 8-9, p. 283*).—It is stated that a parasitic fungus rarely kills the host outright. Usually it either causes no apparent alteration of tissues, or, if changes are produced, they consist in an atrophied or hypertrophied condition of the diseased portions which later may or may not die according to the character of the parasite.

A new method of combating the enemies of plants, P. Broslavski (*Selsk. Khoz., 1909, Nos. 23–25; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 10 (1909), No. 5, pp. 683, 684*).—According to the author there are no thoroughly reliable and convenient methods for combating the enemies of plants. In his opinion the breeding and selection of resistant plants offers the best method for preventing losses from insect and fungus pests.

[Work in plant pathology], W. B. McCallum (*Arizona Sta. Rpt. 1909, pp. 583, 584*).—The work reported consisted mainly of studies of diseases due to different forms of Fusarium. This involved studies on the methods of infection, life history, separation of the different forms, and similar points. Among the miscellaneous diseases noted were two rather serious diseases of alfalfa, one due to crown gall (*Urophlyctis alfalfæ*), and the other, which attacks the stems, due to a species of Phoma. The late blight (*Phytophthora infestans*) appeared on tomatoes, and this is believed to be the first time that it has been observed in Arizona. The early blight (*Alternaria solani*) was quite serious in some localities. A serious trouble of sugar beets, probably due to Rhizoctonia, was observed, although it was associated with a species of Fusarium, and which fungus was the primary cause of the disease could not be definitely determined.

Report of the institute for plant protection in Hohenheim for the year 1909, O. Kirchner (*Württemb. Wchnbl. Landw., 1910, No. 22, pp. 350–357*).—This is a summary of the results of experiments conducted at this station during the year 1909, mainly on the wintering of winter-sown grain, and on the insect and fungus diseases of cereals, truck crops, grapes, orchard and forest trees, and ornamental plants.

Much attention was given to smuts and rusts, especially with reference to the relative susceptibility of different varieties of grain to these diseases.

Notes on insect and fungus pests (*Jour. Bd. Agr. [London], 17 (1910), No. 3, pp. 215–217*).—Among the pests noted are pear thrips, nematodes and clover midge on clover, currant black knot (*Plowrightia ribesia*), corky scab (*Spongospora scabies*), blackleg of potatoes, and cucumber and tomato canker (*Mycosphærella citrullina*) on both seedlings and older plants.

The genus Hendersonia, E. Voges (*Bot. Ztg., 1. Abt., 68 (1910), No. 5, pp. 87–100, figs. 10*).—This is a general discussion of the genus Hendersonia, including its biological and morphological characteristics and methods of culture.

On the significance of teleutospore formation on the Uredineæ, O. Morgenthaler (*Centbl. Bakt. [etc.], 2. Abt., 27 (1910), No. 1–3, pp. 73–92, figs. 18; abs. in Arch. Sci. Phys. et Nat. [Geneva], 4. ser., 28 (1909), No. 11, pp. 489, 490; Bot. Centbl., 113 (1910), No. 17, p. 448*).—After briefly noting the opinions of various investigators on the significance of teleutospore formation, the author gives the results of a number of infection experiments with *Uromyces veratri* on *Veratrum album*, from which the conclusion is reached that the formation of teleutospores, in this instance at least, is governed by the condition of the host plant. If it be in a young and vigorous condition uredospores are produced. If, on the other hand, the leaves are injured, old or poorly nurtured teleutospores are as a rule developed on them.

Publications on the biology of the Uredineæ for the year 1909, E. Fischer (*Ztschr. Bot., 2 (1910), No. 5, pp. 332–336*).—The author briefly discusses the results of work done by various investigators on the cultural problems of the Uredineæ.

Experiments on grain smuts, O. Appel and E. Riehm (*Mitt. K. Biol. Anst. Land u. Forstw., 1910, No. 10, pp. 7–11*).—This is a further discussion (E. S. R., 23, p. 46) of the results of various experiments on the control of the loose smuts of grain by the hot air and hot water treatments, in which the author sums up the results as follows:

For the control of the loose smut of wheat by the application of hot air without any appreciable injury to the germinating power of the plant the grain should be soaked for from 4 to 6 hours in water at 20 to 30° C., and then dried for from 20 to 30 minutes at a temperature of 55 to 60°. A lower temperature during the soaking will require a longer soaking period.

Plasmodiophora brassicæ parasitic on melons, celery, and garden sorrel, E. F. L. MARCHAND (*Compt. Rend. Acad. Sci.* [*Paris*], *150* (*1910*), *No. 21, pp. 1348–1350; abs. in Rev. Hort.* [*Paris*], *82* (*1910*), *No. 12, p. 272*).—The roots of melons (cantaloups) planted on ground previously grown with cauliflower showed enlargements similar to those produced by the club root of cabbage.

On examination the diseased tissues were found to contain the plasmodia and spores of *P. brassicæ*, but the spores were about twice the normal size of those found in the tissues of the cauliflower. This is due, it is claimed, to the succulent tissues of the host and to the very favorable environment for the development of the parasite. Growing with the vines were young celery plants and garden sorrel (*Rumex patientia*), the roots of which were also found to be malformed by the attacks of this parasite.

Club root of cabbage and allied plants, W. H. LAWRENCE (*Washington Sta. Bul. 5, spec. ser., p. 17, figs. 8*).—On account of the gradual dissemination of this disease in the Puget Sound country by means of seeds, plants, and in other ways, gardeners and dairymen are warned against it, and a general description of its characteristics and methods of control are given, together with the results of inoculation experiments.

Clover sickness and phosphorite, P. KOSSOVICH (*Vyestnik Russ. Selsk. Khoz.*, *1909, Nos. 24–26; abs. in Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *10* (*1909*), *No. 5, pp. 692, 693*).—As a result of experiments conducted on chernozem soils the author found that the phosphoric acid of phosphorites was not available and only that obtained from Thomas slag and superphosphates was utilized by clover plants.

The smut of maize and its treatment, D. MCALPINE (*Jour. Dept. Agr. Victoria, 8* (*1910*), *No. 5, pp. 290–298, figs. 11*).—It is claimed that the common corn smut of Australia is the head smut of maize (*Sorosporium reilianum*), and that the American corn smut (*Ustilago zeæ*) has not yet been found there.

The Australian smut attacks mainly the cobs and tassels, and the mode of infection is through the young seedlings by means of spores adhering to the grains, as was shown by infection experiments. Seed disinfection by means of copper sulphate or formalin was found effective in controlling the disease.

Studies on potato fusaria, O. APPEL and W. WOLLENWEBER (*Mitt. K. Biol. Land u. Forstw., 1910, No. 10, pp. 14–16*).—This is a further discussion (E. S. R., 23, p. 148) of the morphology and biology of the genus Fusarium, with special reference to the pathogenic possibilities of some of its species.

Notes on the life history of Phytophthora infestans, D. MCALPINE (*Ann. Mycol., 8* (*1910*), *No. 2, pp. 156–166, pl. 1; abs. in Queensland Agr. Jour., 25* (*1910*), *No. 1, pp. 32–34, pl. 1*).—In a series of experiments with this fungus sound potato tubers were infected by contact with the diseased tubers, by means of sporangia, and by sporangia from diseased tomatoes. Healthy tomato fruits were also infected by sporangia from diseased potatoes and tomatoes.

It was also shown that (1) the fungus may pass through all the stages in its life from sporangia to sporangia in about 7 hours, (2) the mycelium under ordinary conditions may produce sporangia in from 42 to 45 hours and in the case of tomatoes in about 7 hours, (3) the formation of sporangia is prevented by a dry heat of 27° C., (4) sporangia lose their vitality in 20 hours if kept dry, (5) zoospores are incapable of germination if kept dry for 24 hours, and

(6) the mycelium inside the tubers is sterilized when subjected to a dry heat of from 48 to 50° for 4 hours without injury to the vitality of the potatoes.

The leaf roll disease of the potato in moor lands, W. BERSCH (*Ztschr. Moorkultur u. Torfverwert., 8 (1910), No. 2, pp. 90–96, figs. 2*).—Attention is called to the gradual spread of this disease to potatoes cultivated on both high and low moor lands. In some instances the disease appeared on land which for the first time had been planted in potatoes, thus excluding the possibility of the infection coming from the soil. A record is given of 3 varieties of potatoes which for 4 years have proved highly resistant to the disease, as evidenced by a practically undiminished yield during that time.

The author gives the characteristics of this disease during its progressive development, from the first year, which usually shows only discolored fibrovascular bundles, to the third year of dwarfed plants, curled leaves, and small greenish tubers, which often lie on or near the surface of the soil. By this time the disease has usually reached its maximum of intensity in any given locality and for any special variety of potatoes.

Our present knowledge of the leaf roll disease of the potato, G. KÖCK (*Monatsh. Landw., 2 (1909), p. 379; abs. in Centbl. Bakt.* [etc.], *2. Abt., 26 (1910), No. 25, pp. 697, 698*).—After briefly reviewing the theories held by various investigators as to the cause of this disease, the author states that so far inoculation experiments with *Fusarium solani*, *F. schachtii*, *F. oxysporum*, and Verticillium on healthy potato plants have given only negative results. Nevertheless it seems certain that the disease, at least during its earlier stages, is due to a fungus parasite which is transmitted through the seed tubers and under certain conditions by means of infected soil.

Investigations on the cause of the heart or dry rot of the sugar beet, W. RUHLAND and K. ALBRECHT (*Mitt. K. Biol. Anst. Land u. Forstw., 1910, No. 10, p. 16*).—In a brief discussion of the claim that heart or dry rot of beets is caused by the fungus *Phoma betæ* it is stated that neither by experiments nor by the direct examination of the diseased beets has it been possible to show that *P. betæ* is the primary cause of the disease.

Cultural experiments on the control of the heart or dry rot of the beet, W. RUHLAND and K. ALBRECHT (*Mitt. K. Biol. Anst. Land u. Forstw., 1910, No. 10, p. 17*).—Several varieties of sugar beets were tested for their resistance to this disease. Experiments were also conducted on the use of ammonia nitrogen in place of nitrate nitrogen, but no essentially new results were obtained.

Some sugar cane diseases, C. W. EDGERTON (*Louisiana Stas. Bul. 120, pp. 3–28, figs. 12*).—On account of the difficulty in obtaining good stands of cane during the past season, investigations as to the cause were made. The trouble was found to be due primarily to several fungus diseases which have been much more severe this year than usual, partly on account of the very dry spring, this reducing the vitality of the cane and thus making it more susceptible to the diseases.

Red rot (*Colletotrichum falcatum*), rind disease (*Melanconium sacchari*), and root rot (*Marasmius plicatus*), are widely distributed over the State, while the pineapple disease (*Thielaviopsis ethaceticus*) is known in only one parish.

The distribution in the State, characteristics of each fungus, damage to the cane, and methods of treatment are given.

The root diseases of the sugar cane in Barbados (*West Indian Bul., 10 (1910), No. 4, pp. 347–349*).—In response to a letter of inquiry concerning the prevalence and hosts of the root disease of sugar cane (*Marasmius sacchari*), it is stated that the disease is very prevalent in Barbados and is increasing in extent and

virulence. A disease believed to be due to *M. sacchari* has also been found on Guinea corn, imphee, and sweet potatoes.

This disease is not so prevalent on sugar cane on land on which cotton has been grown previously, although in some instances the cane on such land has been severly attacked, this being due, it is thought, to the use of infected farmyard compost. In fields which have been allowed to lie fallow the disease exists in an inverse ratio to the length of the fallow period, the shorter the period the greater the amount of disease being present.

Notes on the mosaic disease of tobacco, Perreau (*Bul. Soc. Bot. France, 56 (1909), No. 1, pp. 53–55*).—Attention is called to the appearance of this disease in a field of tobacco growing on land which for 30 years had had no tobacco on it. The disease was probably introduced either by means of the seed or by the débris of leaves, capsules, etc., intermingled with the seed.

By the use of seed from disease-resistant plants grown on land free from infected leaves, stems, etc., plants were produced which were practically free from the disease, thus confirming the previous statement (E. S. R., 16, p. 677) that by the proper selection of resistant varieties of tobacco this disease can be controlled.

Rust and smut resistance in wheat and smut experiments with oats and maize, D. McAlpine (*Jour. Dept. Agr. Victoria, 8 (1910), No. 5, pp. 284–289*).—In experiments on rust resistance in wheat, 21 varieties of wheat were used and other species or subspecies of Triticum, viz, einkorn (*T. monococcum*), emmer (*T. sativum dicoccum*), spelt (*T. sativum spelta*), and Polish wheat (*T. polonicum*).

Of the 21 varieties tested only 1 was absolutely rust free, viz, Rieti, a French bearded variety, and 5 practically free, viz, Red Egypt, Thew, Cedar, Warren, and Selection No. 4 of Tripola×Tardent Blue. Of 5 varieties of wheat sent from Utah, all were rusted. Two Swedish wheats immune to yellow rust (*Puccinia glumarum*) in their native soil were also rusted.

In tests on the resistance of different varieties of wheat to smut (*Tilletia lævis* and *T. tritici*), 2 varieties were found to be highly smut resistant, viz, Ohio and Genoa.

The relative efficiency of several fungicides on bunt was also tested. Funguslne, a trade compound, showed 81 per cent of the grain germinated and 19.2 per cent smutted; copper sulphate, 73 per cent germinated and 2.2 per cent smutted; formalin, 68 per cent germinated and 8.2 per cent smutted; 2 per cent solution of phenol, 71 per cent germinated and 16.3 per cent smutted; and the check plat, 85 per cent germinated and 88 per cent smutted.

The relative effects of copper sulphate and formalin on germination, infection, and yield were also tested.

Experiments with flag smut designed to test the relative virulence of the disease when smutty seed was sown in clean ground and when clean seed was sown in ground containing diseased straw from previous crops were made, and the effects of different treatments on the seed both before and after infection were also tried. Smutty seed in clean ground gave 83 per cent of infection and clean seed in infected ground 52 per cent. Seed dusted with spores and afterwards treated with copper sulphate solution gave no smut, likewise seed first treated with copper sulphate and then dusted with spores. Grain treated with copper sulphate and diseased straw added showed an infection of 29 per cent, and when treated with corrosive sublimate and planted with diseased straw an infection of 44 per cent was found.

Copper sulphate is, therefore, only effective against smutty seed in a clean soil. Neither copper sulphate nor corrosive sublimate will prevent smutting in soil already contaminated by diseased straw.

The leaf cast diseases of currants and their successful control, H. ROSENTHAL (*Deut. Obstbau Ztg., 1910, No. 14, pp. 172, 173, fig. 1*).—It is claimed that the two fungi *Glœosporium curratum* and *G. ribis*, which often cause the complete defoliation of currant bushes, can be successfully controlled by a ½ per cent soda Bordeaux mixture applied about 8 days after blossoming, with a second application when the berries are gathered.

Cauliflower disease of strawberries (*Jour. Bd. Agr. [London], 17 (1910), No. 3, p. 214, fig. 1*).—In this disease, due to the attacks of a nematode (*Aphelenchus fragariæ*), the flower buds and flower stems are stunted and form short, fleshy, irregular masses resembling pieces of cauliflower. The buds in the axils of the leaves become hard and scaly and do not grow out into stolons. The nematodes are present in the diseased flower buds and the swollen portions of the plant.

Diseased plants should be removed and burned. Sulphate of potash has proved effective in checking the disease when applied at the rate of 100 lbs. per acre.

The diseases of the grape and means of combating them, V. NAZARI (*Staz. Sper. Agr. Ital., 42 (1909), No. 9, pp. 609–806*).—In this paper are described the insect and fungus enemies of the grape as they have appeared each successive year from 1898 to 1907, inclusive, together with the means used for their control. An extended bibliography on the disease of the grape for each year is appended.

Field studies of the crown gall of the grape, G. G. HEDGCOCK (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 183, pp. 40, pls. 4*).—The results are reported of several years' investigations of the crown gall of the grape in the western part of the United States, and especially of the susceptibility and immunity to the disease of the most important varieties of grapes. The author also discusses the distribution and importance of crown gall, its two forms (root and cane galls), its development, effects, cause, cure, and prevention, and gives an extensive bibliography of the subject.

In the experiments on the susceptibility and resistance of various species and varieties of grapes to this disease it was found that two factors enter into the problem. One of these is the susceptibility of the species or varieties to frosts and similar injuries in the locality where they are grown; for example, the Concord, Catawba, Delaware, and other American varieties are perfectly hardy and usually free from the disease, when varieties of *Vitis vinifera* are seriously injured by freezing and frosts and become badly diseased. The second is the variation in the chemical constituents of the sap, the sap of the most resistant vines being especially acid to the taste. Vines of *V. cordifolia* and *V. linsecomii* are susceptible, while varieties of *V. rupestris* and *V. vulpina* are quite resistant, for example, Rupestris St. George and Rupestris Martin. Of European varieties, the Mission of California, Muscat of Alexandria, Flame Tokay, Rose of Peru, and Malaga are very susceptible, but may be grown in infected areas on resistant stocks.

The cause of the disease seems to be *Bacterium tumefaciens*, which produces similar galls on a variety of plants. The crown gall is a communicable disease, and usually attacks the vine through wounds from frost, pruning, insects, etc. Its prevention is mainly a matter of growing resistant varieties or grafting nonresistant scions on resistant stocks. All diseased vines, should be dug up and burned as soon as discovered. In the arid regions, planting deeply, so that not more than one bud will remain above ground is recommended as a protection from freezing and the burning sun. Fungicides gave negative results.

The acidity of the sap of plants in relation to their resistance to the attacks of parasites, R. AVERNA-SACCÀ (*Ann. R. Staz. Chim. Agr. Sper. Roma,*

2. ser., 3 (1909), pp. 283–307; Staz. Sper. Agr. Ital., 43 (1910), No. 2, pp. 185–209).—After a brief discussion of the opinions of various investigators on this question, the author concludes from his experiments and observations that the greater resistance of the American grape and of other plants to the attacks of Oïdium, Peronospora, and gall mites is due to the relative wildness and consequent abundant acidity of these plants as compared with corresponding varieties which have been for years in a high state of cultivation. It is claimed that this greater initial resistance is only temporary and will gradually disappear under the more or less intensive culture to which the vines will be subjected year after year.

Experiments with various sprays in combating the downy mildew (Peronospora viticola) of the grape, A. BRETSCHNEIDER (*Ztschr. Landw. Versuchsw. Oesterr., 13 (1910), No. 3, pp. 135–148*).—In the experiments conducted the following sprays were used: 1 per cent Bordeaux mixture as a standard for comparing the efficiency of the other sprays; 1, 1.5, and 2 per cent solutions of the trade compound Tenax, which is a soda-copper spray in which part of the copper sulphate has been replaced by aluminum sulphate; Cucasa, a saccharine Bordeaux mixture of normal strength; 2 and 3 per cent copper-sulphate-formaldehyde mixtures; and 1 and 2 per cent solutions of a trade compound known as rational hydro-copper salt fungicide. The composition and preparation of each spray is given, while the number of applications, dates of spraying, and the results for each mixture are set forth in a table showing the comparative results at four widely separated localities.

A careful study of the effects of the sprays on the mildew gave the following results: The formaldehyde, copper-sulphate-formaldehyde, and hydro-copper salt solutions each proved of little value as a fungicide, and the two last named injured the plants; both the Tenax and Cucasa controlled the mildew with no appreciable injury to the vines, and may therefore be considered of value in combating this disease.

Experiments on the apple with some new and little-known fungicides, M. B. WAITE (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 58, pp. 19*).—A preliminary report is made on some experiments with 9 different fungicides in connection with a study of the spray injuries to apples caused by Bordeaux mixture.

The main experiment (series 1) was carried out at Winchester, Va., during 1909, and was supplemented by similar tests on 3 other orchards. Three varieties of apples were used, viz, Ben Davis, Yellow Newton, and York Imperial, and they were divided into 11 plats, as follows: (1) Control, unsprayed; (2) standard Bordeaux mixture (3:3:50); (3) iron Bordeaux mixture (Bordeaux mixture, 3:3:50 plus 2 lbs. of iron sulphate); (4) standard Bordeaux mixture plus gypsum (3:3:50 plus 3 lbs. of gypsum); (5) standard Bordeaux mixture (3:X:50, X equaling the lime added until the neutral point was reached as shown by the litmus test); (6) self-boiled lime-sulphur mixture (10:10:50); (7) "copper sulphid mixture No. 1" (self-boiled lime sulphur 10:10:50, plus 2 lbs. of copper sulphate); (8) "copper sulphid mixture No. 2" (Bordeaux mixture 3:3:50, plus 1 gal. of commercial lime-sulphur solution); (9) "iron sulphid mixture" (self-boiled lime sulphur 10:10:50, plus 3 lbs. of iron sulphate; (10) arsenate of lead (used alone), 2 lbs. to 50 gal.; and (11) control, unsprayed.

To each of these fungicides 2 lbs. of arsenate of lead in the form of paste was added to every 50 gal. of spray mixture. The sprays were applied with an ordinary hand barrel pump first on May 11 and 12, shortly after the petals had fallen and while the calyxes were still open. The second application was made June 11 and 12, and the third July 19.

All the fungicides protected the trees almost completely from fungus diseases, and since the arsenate of lead was combined with them they also controlled

the codling moth and other insect pests. As regards spray injuries, all the fungicides containing copper russeted the fruit of the Ben Davis from 10 to 60 per cent. The "copper sulphid mixture" made from self-boiled lime-sulphur mixture was the least injurious copper spray to the fruit of Ben Davis (10 per cent), while the neutral Bordeaux mixtures proved the worst, even injuring the fruit of York Imperial, followed by standard Bordeaux mixture 3:3:50, which gave 60 per cent of injury to Ben Davis fruits. Copper poisoning occurred also on the leaves, damaging them to a greater extent than the fruit, and reaching as high as 80 per cent on Yellow Newton when Bordeaux mixtures were used. Adding certain materials, such as gypsum, iron sulphate, and lime sulphur, to Bordeaux mixture in all cases reduced the injury, but did not entirely prevent it, except in the case of the self-boiled lime-sulphur mixture in part, where a new compound was formed. The new "copper sulphid mixture" (No. 7), tested for the first time, proved very effective and almost entirely noninjurious, except to the fruit of Ben Davis. The new "iron sulphid mixture" (No. 9) was entirely harmless and gave remarkably good results, except that it produced distinctly greener fruit, which can probably be avoided by allowing the fruit to remain longer on the trees. It gave the most perfect protection from fungi, the fruit having no infection whatever, and the leaves only 0.5 per cent. The foliage on this plat had a fine, dark green color, and held on later than any other leaves in the orchard. The twigs were also stockier and the buds finer than on any other plat, although the self-boiled lime sulphur was a close second. During the summer the "iron sulphid mixtures" spray adhered so closely and was so abundant as to give the trees a brownish appearance, but this wore off by picking time. The arsenate of lead used alone seemed to possess considerable fungicidal value, but is probably not to be depended upon for general use.

The bitter pit of the apple, D. McAlpine (*Jour. Dept. Agr. Victoria, 8 (1910), No. 4, pp. 201, 202; Producers Rev., 5 (1910), No. 2, p. 52*).—This is a physiological disease characterized by a spotting of the fruit due to an abnormal flow and sudden checking of the sap during the period of fruit formation.

Experiments conducted during a number of years with various fertilizers indicate that complete fertilizers aggravate the disease. The effects of iron sulphate and magnesium sulphate were also tried, each salt being used at the rate of 3 lbs. per tree. Although the iron sulphate gave a deep green color to the leaves and an extra good yield, there were pitted apples all over the trees, and the disease developed further in storage.

No adequate remedy for this disease has yet been found.

The bleeding stem disease of the coconut, T. Petch (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 4 (1909), No. 22, pp. 197–305, pls. 4*).—In a previous paper (E. S. R., 22, p. 248) attention was called to the characteristics of and remedies for this disease (*Thielaviopsis ethacceticus*). In this paper a more elaborate discussion is given on the effects of the disease, its influence on the crop, the distribution, cause, general biology of the fungus, efforts of various chemicals on the growth of the fungus, treatment, methods and suggested sources of infection and other causes of bleeding, and the distribution of the fungus in other countries.

On the relationship of certain coniferous diseases to the original source of the seed, D. Frömbling (*Forstw. Centbl., n. ser., 32 (1910), No. 4, pp. 193–200*).—The author discusses the probable relationship that may exist between the outbreak of certain coniferous diseases, such as larch canker (*Peziza willkommii*), spruce scab (*Hysterium macrosporum*), and needle cast (*Lophodermium pinastri*), and the source from which the original tree seed came. It is claimed that large quantities of such seeds have been sold which came from other countries or from localities with different climatic and soil environments

from that in which they were destined to be used, and that under these new conditions the trees from such seeds will be more susceptible to serious epidemics of disease.

Leaf shedding in conifers due to Botrytis cinerea (*Bd. Agr. and Fisheries [London], Leaflet 234, pp. 3, fig. 1*).—A brief description is given of the characteristics of this disease, which has been recorded as attacking the seedlings of several species of conifers.

The following preventive measures are suggested: (1) Perfect cleanliness in the seed bed is of primary importance, and no dead or dying weeds, plants, etc., should be left on the bed, as the Botrytis will infest these and go from them to the leaves of the seedlings; (2) stable manure when used on the beds should be perfectly buried in the soil; (3) low lying situations should be avoided, as nursery sites; (4) when the disease is present there should be spraying with a solution made of 11 lbs. sulphate of copper, 16 lbs. carbonate of copper, 1 lb. permanganate of potash, and 3 lbs. soft soap, dissolved in 100 gal. of rain water; (5) all diseased seedlings should be collected and burned.

The fight against the pine tree rot fungus, A. MÖLLER (*Ztschr. Forst. u. Jagdw., 42 (1910), No. 3, pp. 129–146*).—The author discusses the various methods used in combating this fungus (*Trametes pini*), which has become a dangerous forest parasite throughout Germany.

The remedies recommended are the removal as far as possible of all infected trees, the cutting out of all sporophores on trees left standing, and the tarring over of the wounds thus formed. This will usually prevent the formation of new sporophores at these points, but not on other parts of diseased trees. At suitable intervals, not longer than every 5 years, all mature trees should be thoroughly examined for infection.

If these methods are followed it is claimed that in time the fungus will become rare in forests thus treated.

Infection experiments with Plasmodiophora brassicæ, O. APPEL and E. WERTH (*Mitt. K. Biol. Anst. Land u. Forstw., 1910, No. 10, pp. 17, 18*).—In experiments with this parasite on *Erysimum strictum*, *Sisymbrium austriacum*, *S. strictissimum*, and *Raphanus sativus*, the roots of both the Sisymbrium species showed large and irregular warty outgrowths. On the Erysimum large fissured cracks were formed, while on *R. sativus* no deformation occurred, but the attacked parts of the roots were blackened and turned somewhat moldy.

Summer felled wood, J. SCHORSTEIN (*Österr. Forst u. Jagd Ztg., 27 (1909), No. 42, pp. 368, 369, fig. 1*).—It was found by experiments that pine and fir trees cut in the summer were more susceptible to the attacks of the timber-rot fungus (*Merulius lacrimans*) than when cut in the fall or winter, on account of the quantity and character of their water content at that time of the year.

It is recommended that timber be cut only in the fall, as the sap at that time contains substances unfavorable to the germination of the fungus spores.

Some new parasitic fungi of ornamental plants, G. TRINCHIERI (*Bul. Orto Bot. R. Univ. Napoli, 2 (1909), No. 3, pp. 409–416; Rend. Accad. Sci. Fis. e Mat. Napoli, 3. ser., 15 (1909), No. 3–4, pp. 87–93*).—The author describes as new the following fungi: *Metasphæria aloes* n. sp., on the dried scapes of *Aloes plicatilis*; *Phyllosticta cavaræ* n. sp., forming irregular, brownish-gray to dirty white spots on both surfaces of the leaves of *Anthurium crassinervii*; *Phoma aloicola* n. sp., on the dried scapes of *Aloes brevifoliæ*; and *Microdiplodia anthurii* n. sp. and *Glœosporium anthuriophilum* n. sp. on the leaves of *Anthurium crassinervii*.

A geranium disease due to eelworms, J. C. CHAPAIS (*Ann. Rpt. Quebec Soc. Protec. Plants [etc.], 1 (1908–9), pp. 37–39*).—A brief description is given of the appearance of geranium plants when attacked by eelworms (*Anguillula

heterodera), accompanied by a popular discussion of eelworms and methods of combating them.

The biology of the anther smut of Lychnis (Melandrium) album, E. WERTH (*Mitt. K. Biol. Anst. Land u. Forstw., 1910, No. 10, pp. 11, 12*).—The results of further experiments on the flower infection of *L. album* by *Ustilago violacea* are given, confirming in the main the author's previous experiments (E. S. R., 23, p. 355).

Bloom infection of the pistillate flowers was successfully repeated with the production in some instances of a form intermediate between the normal pistillate flower and the hermaphrodite smutted flower. The staminate flowers were also inoculated with the smut spores, giving results similar to those obtained with pistillate flowers. Experiments on direct infection of young seedlings with the smut spores gave no definite results.

In these experiments it is claimed that the smut spores on the pistillate flowers neither directly by germ tubes nor indirectly by sporidia penetrated into the stigmas of the inoculated flowers. On the contrary the fungus begins after the death of the stigma a saprophytic existence with repeated conidia formation.

A frequent disease of pelargonium cuttings, L. PETERS (*Gartenflora, 59 (1910), No. 10, pp. 209–213, pl. 1*).—Investigations of the death of large numbers of pelargonium cuttings showed that the portions of the stems in or near the ground had turned brown and dry from the cutting off of the food supply.

A microscopic examination of the diseased tissues indicated that the fungus, *Pythium debaryanum*, was the cause of the death of the plants. This was also proved by inoculation tests with pure cultures of the fungus on healthy plants.

Some common diseases of the rose, R. LAUBERT (*Gartenflora, 59 (1910), Nos. 4, pp. 66–76, pl. 1; 5, pp. 97–106*).—A popular description of, and remedies for, several diseases of roses are given, including rose rust (*Phragmidium subcorticium*), rose mildew (*Sphærotheca pannosa*), leaf spot (*Actinonema rosæ*), twig canker (*Coniothyrium wernsdorffiæ*), the Botrytis rot (*Botrytis cinerea*) of the flowers and peduncles, downy mildew (*Peronospora sparsa*), stem or branch tumors on climbing roses, and a disease of the La France rose in which the plants wilt and in a few days shed their leaves, often finally dying. In this last-named disease the fruit bodies of the fungus *Rœsleria pallida* were found on the roots of the dead plants, but whether this fungus is the initial cause of the disease or only a saprophyte is uncertain.

The control of the rose mildew, H. SCHMIDT (*Österr. Gart. Ztg., 4 (1909), No. 7, pp. 249, 250; abs. in Centbl. Bakt.* [*etc.*], *2, Abt., 26 (1910), No. 16–17, p. 482*).—The application of from 1 to 1½ shovelfuls of air-slaked lime as a fertilizer around each rose bush in the fall of the year is recommended. If after this treatment small patches of mildew appear, the plants should be dusted on a sunshiny day with powdered sulphur.

A new tulip disease, F. WORTMANN (*Möller's Deut. Gärt. Ztg., 25 (1910), No. 15, p. 177*).—Attention is called to a disease of tulips, which forms in the middle of the scapes a watery translucent zone, at which point under the weight of the flower head the stem bends and causes the bloom to hang downward.

An examination of the diseased bulbs shows that they are not well rooted, the roots being rolled up in a ball beneath the bulb scales. These diseased bulbs send up their scapes sooner than the healthy ones.

The cause of the disease is not stated.

Concerning a fungus parasitic on Zinnia violacea, G. TRINCHIERI (*Bul. Orto Bot. R. Univ. Napoli, 2 (1909), No. 3, pp. 445–449; Rend. Accad. Sci. Fis. e Mat. Napoli, 3. ser., 15 (1909), No. 5–7, pp. 140–144*).—The flower heads of

Z. violacea were found to be attacked by a rot resembling the heart rot of the chrysanthemum flower (E. S. R., 22, p. 750). An examination of the diseased flowers revealed the presence of a fungus the characters of which correspond exactly to those of *Botrytis vulgaris*, which hitherto has been classed as a saprophyte, but in this case seems to lead a truly parasitic existence.

The brown fungus of the citrus whitefly, H. S. Fawcett (*Science, n. ser., 31 (1910), No. 806, pp. 912, 913; Mycologia, 2 (1910), No. 4, pp. 164–168, pls. 2*).—An account is given of investigations on the brown fungus of the whitefly, previously described by Webber (E. S. R., 9, p. 658). This fungus as occurring on the whitefly is sterile. In 1905 sporodochia were found accompanying the fungus, and recently the connection between these forms of the fungus have been determined. The author describes the fungus as *Ægerita webberi* n. sp.

Some notes on nematodes, G. H. Carpenter (*Irish Gard., 5 (1910), No. 49, pp. 34–37, figs. 3*).—This is a popular discussion of the morphology and habits of nematodes in general, and of the stem nematode (*Tylenchus devastatrix*), the strawberry nematode (*Aphelenchus fragariæ*), and the root knot nematode (*Heterodera radicicola*), together with suggestions as to their control.

A lime-sulphur wash for use on foliage, E. S. Salmon (*Jour. Bd. Agr. [London], 17 (1910), No. 3, pp. 184–189*).—The results are given of experiments on the use of lime sulphur in combating the hop mildew (*Sphærotheca humuli*), the gooseberry mildew (*S. mors-uvæ*), and apple scab or black spot.

In the experiments with the hop mildew, a number of leaves on young hop plants were selected which bore patches of the mildew in an actively growing condition. Each leaf was divided into halves by a longitudinal line, and only one-half of each leaf was painted with a lime-sulphur wash. In each case the patches of mildew on the treated half were killed, while on the other half of the leaf the mildew continued to increase. No fresh infections took place on the treated halves.

In another experiment healthy young hop plants were selected. One-half of each of the leaves was treated with the lime-sulphur wash, and the spores of the hop mildew were then sown on both the treated and the untreated halves of each leaf. In no case did any infection take place on the treated parts of the leaves, while the untreated halves of the leaves became virulently infected and after 14 days bore numerous patches of the mildew.

A number of young hop plants beginning to be infected with the mildew were treated with a fine misty spray of the lime-sulphur wash until when dry the leaves appeared as though dusted with a fine white powder. The mildew was effectually destroyed, and no new infection occurred on the sprayed plants, while on the unsprayed ones the fungus continued to increase.

The lime-sulphur wash was also used on gooseberries for the gooseberry mildew and on certain varieties of apples for the apple scab or black spot with no scorching of the foliage.

The lime-sulphur wash used in these experiments had a specific gravity of 1.01.

The summer use of concentrated lime sulphur, H. H. Whetzel (*Reprint from Proc. N. Y. State Fruit Growers' Assoc., 9 (1910), pp. 31–44*).—In a paper presented at the ninth annual meeting of the New York State Fruit Growers' Association the author summarizes the results of work done by various investigators on the use of lime-sulphur mixtures with special reference to their value as summer sprays.

The following points were discussed: (1) The kind of lime-sulphur mixtures (Scott's self-boiled, Cordley's home-boiled, or commercial concentrated solutions) which can be used as summer sprays; (2) the dilutions of the concentrated solutions which may be used with safety and efficiency; (3) the effect-

iveness of these concentrated solutions as compared with Bordeaux mixture; and (4) the insecticides which can be used with these concentrated lime-sulphur solutions.

It is claimed that the dilutions of the concentrated solutions which may be used with safety and efficiency depend upon the character of the mixture, the foliage to be sprayed, the fungi to be fought, the quantity and thoroughness of the application, and the character of the attendant weather conditions. Taking the above factors into consideration, the following dilutions of commercial concentrates testing from 32 to 34° B. are proposed: For apple scab 1:30, for peach rot and scab 1:200, for peach leaf curl 1:15, for grape diseases 1:40, for potato blight 1:25, and for cherry diseases 1:40.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Report of the Bombay Bacteriological Laboratory for the year 1908, W. G. LISTON (*Rpt. Bombay Bact. Lab. 1908, pp. 15*).—It is stated that the Plague Research Commission has been able to show that the differences in the seasonal prevalence of plague in such places as Poona and Belgaum as compared with Bombay and the Punjab can be explained by the differences in the several places of the seasonal prevalence of rat fleas, the number of rat fleas present in any particular place being a dominating factor which makes that place particularly liable to plague at any time. Experiments with Clayton gas as a disinfectant failed to yield satisfactory results under the conditions generally met with in India. This was mainly because the structure of the average Indian house is such that it freely allowed the escape of the gas from innumerable apertures, especially in the roof which could in no practical way be closed.

Experiments were made with a small type of Leybold's apparatus, especially designed for the destruction of rats in houses. With this machine air is passed over burning coal or coke, preferably the latter, generating carbon monoxid. The gas is then passed through a scrubber and, in the hand machine used in the experiments, is driven to the room to be disinfected along a 1½ in. pipe by means of a rotating fan. The gas proved to be very effective in killing rats at low levels in the rooms and even penetrated into burrows which passed in a downward direction beneath the ground level killing the rats contained in the burrows. It failed, however, to kill rats suspended a few feet above the ground. The rats had to be exposed for several hours to the gas before they were killed. Apparently they were not aware from which direction the poisonous gas came, because they did not attempt to escape from the room when liberated in it as they did when Clayton gas was used. Despite the effect on rats, rat fleas escaped unharmed. It was shown that fleas could be exposed for 1½ hours without harm in a sample of the gas which contained 6.6 per cent carbon monoxid, while a small rat was killed in 10 minutes.

Of 110,512 rats examined during the year 13,489 were found infected with plague. Experiments made with insecticides, rat traps, etc., are briefly noted.

Rat destruction in the Punjab (*Jour. Trop. Med. and Hyg.* [*London*], *13* (*1910*), *No. 2, pp. 26, 27*).—This article includes a quotation from the Sanitary Report of the Punjab for 1908, by S. B. Smith, which relates to the progress of rat destruction in the province.

"Rat destruction by trapping is now systematically carried out in over 100 municipal towns and in 620 endemic centers, or places which, in the past, have been dangerous diffusion centers of plague. . . . Rat poisoning has been limited to those places infected late in the spring, to prevent or delay recrudescence, and to healthy villages near an infected one, to render them immune, while the epidemic is going on. The results appear to be favorable, and plague

has not spread in the usual way. The actual number of rats known to have been destroyed was 4,116,334, and large numbers were destroyed by poisoning which were not recorded. Rat destruction has been taken up with much energy in the native state of Patialla, where 259,141 rats were destroyed; this is reported to have been attended with markedly favorable results."

Mice and the transmission of certain infectious diseases, P. BARABASCHI (*Gaz. Ospcd. e Clin. [Milan], 30 (1909), No. 134, pp. 1417–1419; abs. in Jour. Amer. Med Assoc., 54 (1910), No. 2, p. 171*).—The author reports that he has found the pneumococcus, the anthrax bacillus, streptococci, and staphylococci, alone or associated, in the intestines of various mice caught in private houses, showing that mice are liable to transmit various infections beside the plague. The mice with the pneumococcus were caught in houses where there had recently been pneumonia. The excreta of the mice, drying and scattering in dust, may transmit infection even without more direct contact. The greatest danger from this source is incurred by persons working in granaries, etc., where mice abound and their dejecta are scattered over the substances handled.

The kea: A New Zealand problem, G. R. MARRINER (*London, 1909, pp. 151; rev. in Nature [London], 82 (1909), No. 2094, pp. 186, 187*).—The author has collected the evidence available and personally investigated the habits of this remarkable parrot. He finds that the bird kills sheep as has been previously reported. It is thought that the large sums of money paid for kea heads must have done a good deal to keep the birds in check, though their haunts in the mountain regions of the South Island are often so inaccessible that it is doubtful if they are ever exterminated.

The natural food of this parrot consists of fruits, roots, honey, worms, insects, and grubs. The author believes the inordinate curiosity of the kea to be responsible for its predilection for fresh meat, that it first began by experimenting with sheep skins and dead carcasses, and later on took up killing sheep.

The feeding habits of the rook, Corvus frugilegus, W. E. COLLINGE (*Jour. Econ. Biol., 5 (1910), No. 2, pp. 49–64*).—"The results of this investigation, embracing a consideration of the stomach contents of 830 rooks, shot throughout the years 1908–9 throughout England and Wales, show that 67.5 per cent of the food of the rook consists of grain. If to this we add that of roots and fruits, the percentage is raised to 71 per cent. The animal food content was only 29 per cent, of which quite one-third must be reckoned against the rook. There is ample evidence to show that with the present large number of rooks, a grain diet is preferred. So far as the evidence of this inquiry shows, the rook is not a particularly beneficial bird to the agriculturist, although its usefulness might be considerably increased were it fewer in numbers."

Proceedings of the twenty-second annual meeting of the American Association of Economic Entomologists (*Jour. Econ. Ent., 3 (1910), No. 2, pp. 113–222, pls. 11, figs. 26*).—A continuation of the proceedings previously noted (E. S. R., 23, p. 359).

The paper presented by E. D. Sanderson on The Relation of Temperature to and Growth of Insects (pp. 113–139) has been previously noted (E. S. R., 23, p. 358). E. C. Cotton describes and figures a Constant Low Temperature Apparatus for Biological Investigations (pp. 140–145). Carbon dioxid is the active agent used in refrigeration. The apparatus described was constructed at a cost of about $1,500, the daily cost of operation being about 75 cts. E. F. Hitchings discussed (pp. 146–148) The Unprecedented Appearance of the Saddled-Prominent (*Heterocampa guttivitta*) (E. S. R., 21, p. 759). Notes on the Corn Ear-worm (pp. 149–157), an account of which has been previously noted (E. S. R., 22, p. 754), were presented by T. J. Headlee. P. J. Parrott (pp. 157–161) presented a paper on The Cherry Ermine Moth (*Hyponomeuta padella*), which was intro-

duced into New York State in June, 1909, on foreign nursery stock. It is said that this is the first time that the pest, which in certain European countries is a very destructive enemy of fruit trees, has been introduced into the United States. Present knowledge indicates that it has not established itself in the State. Further Observations on *Empoasca mali;* Notes on *Papaipema nitela* and *P. cataphracta* (E. S. R., 21, p. 56) were presented by F. L. Washburn (pp. 162–168), and a paper on Work on the Apple Maggot by W. C. O'Kane (pp. 169–172). In a paper on Spraying for the Codling Moth (pp. 172–176), E. P. Felt reported experiments made to test the efficiency of a coarse driving spray as compared with a fine mist spray. He concludes that the results obtained seem, so far as the Hudson River is concerned, to justify the belief that one thorough spraying with a Vermorel nozzle within a week or 10 days after the blossoms fall will result in protecting a very large percentage of the fruit from codling moth injury. Notes on the Ten-Lined Potato Beetle in Montana were presented by R. A. Cooley (pp. 178, 179). The author has found that there is but one brood of the Colorado potato beetle in the Gallatin Valley. Under Insect Notes from Illinois for 1909 (pp. 180–186) J. J. Davis reported upon the occurrence of insects of the truck farm and vegetable garden, and insects injurious to flowering plants, shade trees, and ornamental shrubs.

Several papers read by title are presented in the report, namely, The Season's Work on Arsenical Poisoning of Fruit Trees, by E. D. Ball, E. G. Titus, and J. E. Greaves (pp. 187–197); Notes on the "Cigarette Beetle," by P. H. Hertzog (pp. 198–202); Studies of the Development of *Eupelmus allynii* and *Stictonotus isosomatus*, by E. O. G. Kelly (pp. 202–204); Collembola as Injurious Insects (pp. 204, 205), by W. E. Collinge (E. S. R., 22, p. 251); Some Notes upon the Life History and Habits of the Sorghum-Midge (*Contarinia* [*Diplosis*] *sorghicola*) (pp. 205–207), by W. H. Dean (E. S. R., 23, p. 364); Some Insecticide Tests for the Destruction of Aphididæ and Their Eggs, by C. P. Gillette (pp. 207–210); Insect Notes from New Hampshire for 1909, by E. D. Sanderson (pp. 210–212); Insects Notably Injurious in Louisiana During 1908 and 1909, by A. H. Rosenfeld (pp. 212–217); and Notes on *Calosoma frigidum*, a Native Beneficial Insect, by A. F. Burgess (pp. 217–222).

Proceedings of the eighth annual meeting of horticultural inspectors (*Jour. Econ. Ent., 3 (1910), No. 2, pp. 223–250*).—This is a continuation of the report previously noted (E. S. R., 23, p. 360). Three papers were presented, namely, What Should be the Form of our Certificates? by F. Sherman; Some Obscure Diseases of Peach, by J. B. S. Norton; and Local Inspection, Public Sprayers and the Osage Orange Hedge, by T. B. Symons. A general discussion followed.

The entomological section, D. GUNN and F. THOMSEN (*Transvaal Agr. Jour., 8 (1909), No. 29, pp. 77–94, pls. 5*).—The injury caused by the granary weevil, rice weevil, and Angoumois grain moth, and remedial measures therefor are considered. An account is then given of the potato tuber moth (*Gelechia operculella*) which is an important pest in the Transvaal. Tests made in continuation of investigations previously noted (E. S. R., 22, p. 357), to determine the value of chemicals and other substances in preventing the injury to wood by termites are reported. The woolly aphis, cottony cushion scale, peach-tree aphis, cockchafers, fruit fly, and the red and green colored grasshopper (*Ochrophebus carinata*) are also considered.

Entomological notes, B. C. BURT (*Rpt. Cawnpore [India], Agr. Sta., 1909, pp. 41–45*).—Among the species the occurrence of which is noted are the cotton leaf-roller (*Sylepta derogata*), cabbage aphis, spotted boll-worms (*Earias fabia* and *E insulana*), red boll-worm (*Gelechia gossypiella*), *Clavigalla horrens*, *Exelastic atomosa*, black or potato cutworm (*Agrotis ypsilon*), a cricket

(*Gryollodes melanocephalus*), the larva of a tenebrionid beetle which injures wheat and flaxseed, the gram borer (*Chloridea obsoleta*) and the sugar cane moth borer (*Chilo simplex*).

The sugar cane grasshopper (*Hieroglyphus furcifer*) appears to be one-brooded. "The eggs are laid in the ground in November about 2 in. below the surface. Soon after the first rainfall at the end of June or early in July, the young hoppers hatch out and begin to feed on young suger cane or millets, preferring the more succulent millets in this stage. Later on they confine their attack to sugar cane, probably on account of the protection which the crop (usually 4 ft. high at this time) affords from predaceous birds. The nymph molts about 5 times and matures by the middle of September. The mature insect begins to lay eggs in November in the field in which they are feeding, afterwards dying."

Plowing in July and August, although late, did a certain amount of good in checking the pest, the eggs exposed being quite mature and hatching out in 15 minutes after exposure.

Report of the entomologist, W. W. FROGGATT (*Rpt. Dept. Agr. N. S. Wales, 1909, pp. 32–34*).—The work for the year ended June 30, 1909, is briefly reported.

Among the insect pests mentioned as having been of particular importance are fruit flies, the tomato fly (*Lonchæa splendida*), the flea beetle (*Arsipoda macleayi*) which damaged young apples by eating the outer surface, the bean fly, the larger plain locust (*Chortoicetes terminifera*), the pumpkin beetle (*Aulacophora olivieri*) which attacked nectarine foliage and fruit and cherries, as well as garden vegetables, and a species of thrips that injured wheat. An inspection for the fowl tick of 428 domestic fowls consigned to Victoria, South Australia, and West Australia is reported.

The scarabee of the sweet potato, H. A. BALLOU (*West Indian Bul., 10 (1909), No. 2, pp. 180–196, figs. 10*).—*Cryptorynchus batatæ*, which attacks the roots and the base of the vines where they are thickened and woody in structure, is reported to be the source of considerable injury to the sweet potato in Barbados, as much as one-third of the crop being lost on certain estates. Laboratory and field experiments and remedial measures are reported. As yet only general recommendations can be made. The rotation of crops in such a way that sugar cane is always grown between the crops of potatoes is strongly recommended.

The sweet potato moth (*Protoparce cingulata*) seems to prefer the sweet potato, and a severe attack often results in the complete loss of the foliage over entire fields, only the bare stripped vines being left. That severe attacks over large areas occur only at intervals of several years appears to be due in a large measure to natural enemies, particularly a tachinid (*Sturmia distincta*). Mention is made of several other pests of sweet potatoes, including the red spider (*Tetranychus telarius*) and thrips.

Insects which attack vine buds, W. WESLEY (*Agr. Gaz. N. S. Wales, 20 (1909), No. 9, p. 803*).—*Orthorrhinus glindrirostris* is reported to attack buds of the grapevine both before and after they have burst. As the season advances the insects increase in numbers, eating the bark from young wood and destroying the young grapes. The apple and vine root borer (*Leptops hopei*), a similar weevil, attacked the vine and apple buds in the Maitland district and was checked chiefly by hand picking.

Trees attacked by Termes gestroi, H. N. RIDLEY (*Agr. Bul. Straits and Fed. Malay States, 8 (1909), No. 12, pp. 563, 564*).—A list is given of the trees in Johore attacked by this species of white ant.

A new microsporidian parasite of Termes lucifugus, C. PÉREZ (*Proc. Verb. Soc. Sci. Phys. et Nat. Bordeaux, 1908–9, pp. 17–19*).—The name *Duboscqia legeri* is proposed for a parasite of *T. lucifugus*, which represents a new genus and species.

On the feeding habits of the common earwig, Forficula auricularia, W. E. COLLINGE (*Jour. Econ. Biol., 5 (1910), No. 2, p. 68*).—The blossoms and bark of the honeysuckle (*Lonicera periclymenum*) are reported to have been greatly damaged by the common earwig.

On 2 new genera of Thysanoptera from Venezuela, R. S. BAGNALL (*Jour. Linn. Soc. [London], Zool., 30 (1909), No. 200, pp. 329–335, pl. 1*).—The new genera and species are *Anactinothrips meinerti* and *Actinothrips longicornis*.

The cotton stainer bug, C. P. LOUNSBURY (*Agr. Jour. Cape Good Hope, 35 (1909), No. 5, pp. 613–616*).—A general account of these bugs. The species *Dysdercus superstitiosus* appears to be a formidable pest of the incipient cotton industry of the Transkei and the extreme southeastern districts of Cape Colony.

The phylloxera board, H. LOWCAY (*Jour. Dept. Agr. So. Aust., 13 (1909), No. 5, pp. 436–438*).—In this extract from the report of the phylloxera board of South Australia, it is stated that the vineyards of the State are still free from the invasion of grape phylloxera. In 1908, 7,500 acres of vines and in 1909, 6,950 acres were inspected.

[Gossyparia spuria on Viscum album], L. FULMEK (*Centbl. Bakt. [etc.], 2. Abt., 25 (1910), No. 1–4, pp. 106–108, figs. 3*).—The author reports the finding of the European elm scale on the mistletoe (*V. album*) growing in the vicinity of Dürnstein, Austria.

The sugar cane mealy bug (Pseudococcus calceolariæ), J. B. GARRETT (*Louisiana Stas. Bul. 121, pp. 3–19, figs. 7*).—This insect is commonly known to Louisiana sugar planters as the pou à pouche. Information received from some of the oldest cane planters in southern Louisiana indicates that it was imported on seed cane about 25 years ago and became established on some of the plantations near the mouth of the Mississippi River. From that point, it worked its way to districts around New Orleans, making its appearance at the Sugar Station in 1891. Inspections made in the fall of 1907 proved Jefferson, Plaquemines, and Orleans parishes to be infested, while neighboring parishes were apparently uninfested. In this country the species has also been reported from Florida and California. The author has observed this mealy bug on Johnson grass, *Sorghum halepense*, and the saccharine sorghums, as well as on sugar cane; and Calceolaria, Danthonia, *Phormium tenax*, and *Cordyline australis* have been also recorded as food plants of the species.

Observations of the life history of the pest made at Audubon Park during the season of 1907–8 are reported. "The females while quite young are fertilized by the small winged males and normally begin to deposit eggs when about three-fourths grown. If detached from the host plant and prevented from reattaching, they will spin or exude the cottony mass and deposit eggs when not more than half mature. . . . Under normal conditions it was observed that a female would begin to exude the white secretion and oviposit in about 21 days from time of hatching; however, when detached from the host plant oviposition would begin 7 to 10 days earlier. . . . It was found that from 100 to 400 eggs were deposited in a single mass under normal conditions. . . . The eggs hatch in from 4 to 7 days in warm weather, depending on the temperature and humidity. . . . In the early spring before the young canes have begun to joint, the young mealy bugs, which hatch at that time, crawl up and attach themselves in the leaf axils and get subsistence from the leaves. . . . The mealy bugs prefer the stalk to the leaves and will leave the leaf axils and go to the nodes as

soon as the jointing of the cane takes place. When once attached at the node on the stalk, the insect, if undisturbed, seems inclined to remain there throughout its life. The males hatch in the same cottony mass with the females and resemble the latter quite closely at first, but after about 5 days from time of hatching they also collect by themselves under some leaf sheath, or other place of hiding, and begin to spin a long, narrow, white cocoon. In this cocoon they remain until fully matured, emerging in about 14 days in possession of two clear, delicate wings and a pair of long, white, anal spines. When mature the males begin to fly in search of females and can be seen literally swarming around heavily infested stalks of cane. The broods follow one after the other throughout the summer and until cold weather in the fall or winter."

In 1910, due to the cold and lack of food during January, February, and part of March development ceased in all the mealy bugs that were exposed, but when cane was removed from the windrows, it was found that the mealy bugs thereon had continued development due to the protection afforded. It is said that the mealy bugs and their eggs are much more liable to survive the winter when the cane is placed in windrows than when it is planted. Some of the mealy bugs make their appearance above ground quite early in the summer, but the greater part do not appear until jointing of the cane begins.

The Argentine ant (*Iridomyrmex humilis*) attends the mealy bug and gives it protection. This is an important factor, particularly in spring, in increasing the numbers of the pest.

The greatest danger of disseminating the sugar cane mealy bug is through the transportation of infested cane from plantation to plantation, or from one part of the State to another. In order to prevent the pest from being carried to fields which are now uninfested, it is important that planters do not secure seed cane from infested plantations or from an infested field on their own plantations. The greatest damage is done to the germinating eyes or buds of plant cane in the spring. In late summer and fall, when the infestation becomes heavy, large quantities of juice, which at that time contains a comparatively high percentage of sucrose, is sucked out; this means a loss of sugar and retardation of plant growth.

The lady beetle, *Cryptolæmus montrouzieri*, an important enemy of this pest in Australia and Hawaii, was introduced from the latter island in March, 1908, and became an effective enemy of the mealy bug, but was apparently killed by the low winter temperature. The author observed that while the Argentine ant would always drive the adult beetle away from the mealy bug, it would rarely ever attack the lady beetle larvæ. A native lady beetle (*Scymnus intrusus*) destroys the mealy bug but is not sufficiently prolific to be a factor in controlling the pest. A fungus disease due to *Aspergillus* sp. is said to be the most important enemy.

The author concludes that in order to prevent further spread of the mealy bug, it is important that an effective treatment for infested seed cane intended for distribution be devised. Experiments at the station have shown that in heavily infested fields fall planting, if the ground is not too dry and labor plentiful enough to prepare the soil properly, give better results and better stands than spring planting. It is recommended that all Johnson grass along ditch banks and roads be thoroughly burned during the dry spell in the fall, as this will destroy the mealy bugs that congregate among the bases of the plants near the surface of the ground.

The San José scale and its control, A. L. QUAINTANCE (*U. S. Dept. Agr., Bur. Ent. Circ. 124, pp. 18, figs. 10*).—A brief summarized account of the San José scale, its natural enemies, and methods of combating it. An extended account of this insect has been previously noted (E. S. R., 18, p. 653).

On some coccid pests of economic importance, E. E. GREEN (*Jour. Econ. Biol., 5 (1910), No. 1, pp. 1–8, pls. 2*).—Five species are discussed in this paper, namely *Aspidiotus occanica*, which is stated to be the source of enormous injury to coconut palms in the Caroline Islands; *Asterolecanium pustulans seychellarum* n. var., which occurs on *Hevea brasiliensis* in the Seychelle Islands, but is somewhat checked by a fungus parasite; *Eriococcus paradoxus; Cerococcus indicus* n. sp., a pest of some importance in the forests of the Siwaliks, India; and *Lecanium imbricans*, which attacks *Ficus glomerata, F. infectoria*, and the red cedar (*Cedrela toona*) in the district of Balur, India. The last-named species covers the underside of the branches and forms a dense silvery-white mass which rapidly kills the branches attacked and finally the whole tree. The scale is accompanied by a sooty fungus which grows in great quantities on the plants below and this rapidly kills out coffee.

On 2 new species of African coccidæ, R. NEWSTEAD (*Jour. Econ. Biol., 5 (1910), No. 1, pp. 18–22, figs. 2*).—*Hemilecanium recurvatum* from hollow branches of *Plectronia laurentii*, and *Stictococcus formicarius* from hollow branches of *Barteria fistulosa*, near Stanleyville, Upper Congo, are described as new. The latter species is said to be attended by an ant, *Sima spininoda*.

A louse from Orycteropus afer, and a new variety of Amblyomma, L. G. NEUMANN (*Jahrb. Nassau. Ver. Naturk., 62 (1909), pp. 2–6, pl. 1*).—A new louse collected in German West Africa from *O. afer* is described as *Hæmatopinus notophallus*; a tick collected from a rhinoceros in British East Africa as *Amblyomma hebræum magnum* n. var.

Experiments and observations on the development of Trypanosoma lewisi in the rat louse Hæmatopinus spinulosus, F. S. H. BALDREY (*Arch. Protistenk., 15 (1909), No. 3, pp. 326–332, figs. 2; Jour. Trop. Vet. Sci., 5 (1910), No. 1, pp. 101–105, figs. 2*).—The author concludes that a cycle of *T. lewisi* occurs in the rat louse (*H. spinulosus*) which takes from 8 to 10 days. The incubation period in the rat is from 3 to 5 days, at the termination of which time mature trypanosomes may be recognized in the blood.

The plume moths of Ceylon, T. B. FLETCHER (*Spolia Zeylanica, 6 (1909), No. 21, pp. 1–39, pls. 6*).—Part 1 of this work, which appears in this number, is devoted to the Pterophoridæ. A synoptic table of the genera and tables for the separation of the species of Pterophoridæ occurring in Ceylon are included. Eight forms are described as new to science.

"Of the 37 species enumerated, 12 or 32 per cent are at present only known from Ceylon, 17 or 46 per cent are wide-ranging forms which occur in at least 2 other localities, 4 or 11 per cent have only been found hitherto in the Khasi Hills, Assam, and Java, India, the South Indian Hills, and Australia each produces one species which is only known otherwise from Ceylon."

Report of the field work against the gipsy moth and the brown-tail moth, D. M. ROGERS and A. F. BURGESS (*U. S. Dept. Agr., Bur. Ent. Bul. 87, pp. 78, pls. 12, figs. 22, map 1*).—In this bulletin the authors present a comprehensive account of the methods followed and the work accomplished, exclusive of the efforts made to import and acclimatize the European and Japanese parasites, in combating the gipsy and brown-tail moths.

The first part of the report takes up briefly the history, life history, habits, and similar data regarding these pests, and the progress of the state work in Massachusetts from 1890 to 1900. Then follows an account of the work which was again taken up by the States of Massachusetts and Maine in 1905, by Rhode Island and Connecticut in 1906, and by New Hampshire and this Department in 1907. At the time the work on the gipsy moth was abandoned by the State of Massachusetts in 1900, over $1,000,000 had been spent in an attempt to exterminate the pest. Since the work was resumed in 1905, nearly

$4,000,000 has been expended by the different States in New England, by private property owners, and by this Department.

Several sources of distribution of the pest have recently come to light. In March, 1909, wood used in repairing railway track, near Scarboro Beach, Maine, which had come from infested territory in Massachusetts was found to be badly infested with gipsy moth egg clusters. This has resulted in the introduction of a system of inspection of forest products shipped from infested territory. During the winter of 1909 webs containing hibernating caterpillars of the brown-tail moth were discovered in seedling nursery stock imported from France as previously noted (E. S. R., 23, p. 360). "At the close of the season brown-tail moths had been found in shipments of stock received in 15 States, and a single egg cluster of the gipsy moth in a shipment received in Ohio."

The greater part of the experimental work is stated to have been along the line of developing more efficient spraying methods. The use of the tower on power sprayers has resulted in a great saving in the cost of treatment. Tests made in 1909 with large spraying machines to determine the most effective pressures and the best size of nozzle outlets indicate that on an average the ¼-inch nozzle now used will carry the spray 20 ft. farther than a $\frac{3}{16}$-inch nozzle and that it is necessary to maintain a pressure of over 200 lbs. in order to secure satisfactory results. Because of the expense involved in applying and tending burlap, it is not now considered as satisfactory a method of destroying the caterpillars as the more recent system of banding the trees with tanglefoot. In spraying arsenate of lead, 10 lbs. to 100 gal. of water is used, but after the caterpillars are half grown it is often desirable to increase this amount to 12 or 15 lbs. to the same amount of water. The power sprayers, equipment used, etc., and methods of application, are described. It is stated that a machine and crew of men can usually cover about 12 acres of woodland per day, the entire cost of treatment averaging about $10 per acre. The cost of the methods employed, the value of natural enemies in controlling the 2 pests, the introduction of parasites and natural enemies of the 2 pests, the value of the work of suppression to the farmer and fruit-grower, suggestions to the owners of private property in the infested districts, and similar points are also briefly considered.

A list of the more important American publications on the gipsy and brown-tail moths is appended.

An account of some experiments on the edibility of certain lepidopterous larvæ, H. Eltringham (*Trans. Ent. Soc. London, 1909, pt. 4, pp. 471–478*).—A report of experiments conducted to determine the preference of lizards for certain insects.

Mosquitoes: With reference to immigration and horse sickness, and notes on the destruction of their larvæ by fish in the Sudan, A. Balfour (*Cairo Sci. Jour., 3 (1909), No. 37, pp. 241–245*).—Because of the blocking of the current of the White Nile and the overflow of the Blue Nile, great numbers of mosquitoes were brought to Khartoum on steamers. The majority proved to be *Stegomyia calopus*, but *Culex fatigans* was common and *Pyretophorus costalis* also a visitor.

As horse sickness, or blue tongue, was prevalent up the Blue Nile, it is suggested that the introduction of the mosquitoes may have had something to do with the outbreak of the disease in Khartoum. The introduction of 2 species of fish which feed on mosquito larvæ is stated to be under way.

A contribution to the study of distomid parasites of Anopheles maculipennis, G. Allessandrini (*Malaria, 1 (1909), No. 2, pp. 133–137; abs. in Bul. Inst. Pasteur, 7 (1909), No. 12, p. 544*).—The author has found the larva of a distome (apparently that of *Lecithodendrium ascidia*, a parasite of the bat)

in *A. maculipennis*. This is stated to be the larva previously observed by Martirano and Schoo, while the distomes found in mosquitoes by Ruge and Linstow belong to *Distoma globiporum*, a parasite of fish.

The Simulium columbaczense of Roumania, N. LEON (*Centbl. Bakt. [etc.], 1. Abt., Orig., 51 (1909), No. 6, pp. 659–668, figs. 11*).—A somewhat detailed account of *S. columbaczense*, which appears in swarms in certain sections of Roumania, particularly near the Danube, and attack buffaloes, oxen, cows, etc., as well as man, and in some instances even causes death.

A monograph of the African Tabanidæ of the genus Tabanus, J. M. R. SURCOUF (*Paris, 1909, vol. 1, pp. 260, pls. 3, figs. 26, maps 22; rev. in Bul. Inst. Pasteur, 7 (1909), No. 23, p. 1013*).—In addition to the general classification of the species occurring in Africa exclusive of the Mediterranean basin, they are arranged by geographical regions. A bibliography is given.

Some further remarks on the systematic affinities of the Phoridæ, with descriptions of two new North American species, C. T. BRUES (*Bul. Wis. Nat. Hist. Soc., n. ser., 7 (1909), No. 3–4, pp. 103–110, fig. 1*).—*Aphiochæta smithii* bred from an agaric mushroom, collected at Stelton, N. J., and *Puliciphora sylvatica* from Orcas Island, Wash., are described as new.

A preliminary list of the flies of Wisconsin belonging to the families Bombyliidæ, Syrphidæ and Conopidæ, S. GRAENICHER (*Bul. Wis. Nat. Hist. Soc., n. ser., 8 (1910), No. 1, pp. 32–44*).—In this annotated list one syrphid, *Helophilus bruesi*, is described as new.

Three new blood-sucking flies from Paraguay, C. SCHROTTKY (*Ztschr. Wiss. Insektenbiol., 5 (1909), No. 2, pp. 61–63*).—Three species from Paraguay, namely, *Simulium inexorabile*, *S. paranense*, and *S. paraguayense* are described as new to science.

The biology and history of the tsetse flies, E. ROUBAUD (*Rev. Gén. Sci., 20 (1909), No. 22, pp. 916–923, figs. 8*).—Figures of the stages, etc., of *Glossina palpalis* and a map showing its dispersion accompany the account.

The structure, development, and bionomics of the house fly (Musca domestica), III, C. G. HEWITT (*Quart. Jour. Micros. Sci. [London], n. ser., 54 (1909), No. 215, pp. 347–414, pl. 1*).—This is the concluding paper of the series (E. S. R., 20, p. 764).

The author shows the distribution of this fly to be world-wide. Nine species of flies occurring as coinhabitants of houses with *M. domestica* or as visitants are noted. Under the heading of physiology, the influence of food, temperature, and light, hibernation, flight, and regeneration of lost parts are discussed. The natural enemies and occasional parasites considered are *Chernes nodosus*, mites, and *Empusa muscæ*. The true parasites include 2 flagellates (*Herpetomonas muscæ-domesticæ* and *Crithidia muscæ-domesticæ*) and a nematode (*Habronema muscæ*. Mention is also made of the transmission of eggs of *Tænia* and *Ascaris* sp. The pathogenic organisms disseminated by *M. domestica* and its nonblood-sucking allies considered are those of typhoid fever, anthrax, cholera, tuberculosis, ophthalmia, plague, etc., a table being given which shows the source of bacteria from flies. The larvæ of *M. domestica* and its allies are shown to be frequently the cause of intestinal myiasis and diarrhea in children.

A list is given of 99 titles of the more important references and an account of the breeding of *M. domestica* during the winter is appended.

The Berkeley house-fly campaign, W. B. HERMS (*Reprint from Cal. Jour. Technol., 14 (1909), No. 2, pp. 11, figs. 3*).—This is an account of the campaign against the typhoid or house fly which was inaugurated in April, 1909, at Berkeley, Cal.

The author has found that maggots may reach their full growth in 4 or 5 days and then migrate largely from the manure pile and into the loose ground

underneath or into débris near by. The number of full-grown, or nearly full-grown, larvæ in 15 lbs. of samples taken from 5 different parts of a manure pile after an exposure of 4 days, was found to be 10,282, from which it is estimated that in the entire pile, which weighed about 1,000 lbs., there were over 455,000 maggots. When the manure pile was cleaned away, another inspection showed that there were great numbers of maggots collected in pockets on its site and near by. From 1¾ lbs. of manure collected at random 2,561 pupæ were taken.

Attention is called to the fact that the small town lot used for horses must not be overlooked in the campaign against the fly. The fact that the fly does not travel far from its breeding place, probably not more than a block or two, simplifies the matter of control. A fly-tight bin for use as a receptacle for offal is described and illustrated.

The house fly at the bar of indictment.—Guilty or not guilty? (*[New York], 1909, pp. 48, pls. 5, charts 3*).—Brief accounts of the house fly and its relation to disease transmission are contributed by a number of authors.

A contribution to the study of the Pupipara, E. MASSONAT (*Ann. Univ. Lyon, n. ser., 1909, No. 28, pls. 7, figs. 112, pp. 388; abs. in Bul. Inst. Pasteur, 7 (1909), No. 21, pp. 906, 907*).—This work gives an account of the external morphology and internal anatomy of the different families of Pupipara, and discusses the classification of the Hippoboscidæ and Braulidæ occurring in France and Algeria.

Myiasis of the urinary tract, R. CHEVREL (*Arch. Par., 12 (1909), No. 3, pp. 369–450, figs. 13*).—The author reviews this subject at length.

He finds that the literature furnishes reports of 20 cases of myiasis of the urinary tract, of which 6 can be considered as authentic, 10 as very probable, and 4 as doubtful. An additional case was recently reported by Fauvel and the author, making a total of 7 authentic cases. *Fannia canicularis* has been found to be the species most often implicated.

A bibliography of 46 titles is appended.

The common capricorn (Hylotrupes bajulus), a destroyer of telegraph poles, M. E. HENRY (*Bul. Soc. Sci. Nancy, 3. ser., 10 (1909), No. 3, pp. 139–142*).—This beetle is reported to have injured poles of the European silver fir (*Abies pectinata*) at Nancy, France, sufficiently to cause them to fall.

Boll weevil in Mississippi, 1909, R. W. HARNED (*Mississippi Sta. Bul. 139, pp. 43, figs. 28*).—Following a general account of the boll weevil the author discusses its occurrence in Mississippi at length. During 1909, the boll weevil spread over a much larger portion of the State than during the previous year. Pike, Lincoln, Copiah, Hinds, Warren, and Issaquena counties, which were partially infested in 1908, are now entirely within the infested area, as are also Lawrence, Jefferson Davis, Marion, Lamar, Pearl River, Hancock, and Harrison counties. A large portion of Washington, Sharkey, Yazoo, Rankin, Simpson, Covington, Forest, Perry, and Jackson counties are now infested, and a small area of the southwestern parts of Bolivar, Madison, Jones, and Greene counties. It is probable that a small portion of southwestern Smith County is infested, and barely possible that the extreme southwestern portion of Sunflower County has been reached.

Accounts of methods of control and descriptions of the weevils mistaken for the boll weevil follow.

Curculionidæ from various parts of Australia, A. M. LEA (*Mitt. Naturhist. Mus. Hamburg, 26 (1909), pp. 193–203*).—This is an annotated list of the Curculionidæ from different parts of east and south Australia that were found unnamed in the Natural History Museum of Hamburg. Nine species are described as new to science.

Combating the "cigarier" (Rhynchites betuleti) by means of insecticides, P. MAISONNEUVE, L. MOREAU, and E. VINET (*Rev. Vit., 32 (1909), Nos. 812, pp. 39–42; 813, pp. 60–65; 814, pp. 88–90*).—This weevil, known as the cigar roller, has occurred in vineyards in Anjou, France, for many years, but has not until recently caused sufficient injury to warrant combative measures other than collection. In experiments conducted with insecticides here reported, arsenate of lead gave the best results, followed by iron arsenate with nearly as good results.

Diseases of bees, W. MALDEN (*Jour. Econ. Biol., 5 (1910), No. 2, pp. 41–48*).—A brief review of the present status of our knowledge of bee diseases.

Colonies of ants (Lasius neoniger) infested with Laboulbenia formicarum, W. M. WHEELER (*Psyche, 17 (1910), No. 3, pp. 83–86*).—The author calls attention to the fact that 2 species of Laboulbeniaceæ are known to be parasites of ants. One of the two, *Rickia wasmanni*, is found on *Myrmica levinodis* at Linz on the Rhine; the other, *Laboulbenia formicarum*, occurs on *Lasius niger americanus* and *Formica subpolita neogagates* at Cambridge, Mass.

In April, 1910, the last-named parasite was found by the author on *L. niger neoniger* along the seacoast at Ellisville, Mass. The infested colonies seemed to be decidedly less prosperous than those uninfested. The observations made at Ellisville indicate that the parasitic fungus can luxuriate only on the members of ant colonies which have become enfeebled or depauperate through nesting in soil which is too moist, saline, or foul, or of an abnormally high temperature when exposed to the sun.

The chalcidoid parasites of the common house or typhoid fly (Musca domestica) and its allies, A. A. GIRAULT and G. E. SANDERS (*Psyche, 17 (1910), No. 3, pp. 108–117, fig. 1*).—In this second paper (E. S. R., 23, 161) the author reconstructs the genus Pachycrepoideus of the family Pteromalidæ. Specimens reared from dipterous larvæ are described as *P. dubius*, and this species is designated as the type of the genus.

Notes and descriptions of North American parasitic Hymenoptera, VIII, C. T. BRUES (*Bul. Wis. Nat. Hist. Soc., n. ser., 8 (1910), No. 1, pp. 45–52*).—One genus (Aneuron) and 4 species are described as new.

A preliminary list of the proctotrypoid Hymenoptera of Washington, with descriptions of new species, C. T. BRUES (*Bul. Wis. Nat. Hist. Soc., n. ser., 7 (1909), No. 3–4, pp. 111–122*).—Seventeen species, including descriptions of 7 that are new to science, are noted. A key is given to the North American species of the genus Lygocerus.

A new species of Telenomus parasitic on the eggs of tussock moths, C. T. BRUES (*Psyche, 17 (1910), No. 3, pp. 106, 107*).—*Telenomus fiskei* reared from the eggs of *Hemerocampa leucostigma*, in Cambridge, Mass., and Brooklyn, N. Y., and from the eggs of Notolophus on spruce from Machias, Me., is described as new.

On some undescribed Ichneumonidæ and Braconidæ, reared by T. B. Fletcher from Ceylonese Lepidoptera (Pterophoridæ), P. CAMERON (*Spolia Zeylanica, 6 (1909), No. 21, pp. 40–43*).—One ichneumon (*Hymenobosmina trichoptilus*) and 5 braconids of the genus Apanteles are described as new to science.

Panama ticks, S. T. DARLING (*Jour. Econ. Ent., 3 (1910), No. 2, p. 222*).—The occurrence of *Amblyomma dissimile* and *A. varium* is noted. The last-named species, which attaches to *Bufo marinus*, is said to be the intermediary host of *Filaria* sp. and also of a Hemogregarine.

Speleorchestes, a new genus of saltatorial Trombidiidæ, which lives in termites' and ants' nests, I. TRÄGÅRDH (*Ark. Zool., 6 (1909), No. 2, pp. 14, figs. 14*).—Two species, *S. termitophilus* which occurs in termites' nests in

Zululand, and *S. formicorum* found in the nest of *Formica rufa* in Sweden, are described as belonging to the new genus Speleorchestes.

Epidemic of silver maple leaf-mite, A. C. BURRILL (*Bul. Wis. Nat. Hist. Soc., n. ser., 7 (1909), No. 3-4, pp. 123-129*).—*Phyllocoptes* [*Eriophyes*] *quadripes* is said to have been unusually abundant and injurious to the silver maple at Whitefish Bay, Wisconsin. A bibliography is included.

The present status of our knowledge of the rôle of arthropods in the transmission of infectious diseases of vertebrates, P. MANTEUFEL (*Zool. Zentbl., 16 (1909), No. 2-3, pp. 41-81; abs. in Bul. Inst. Pasteur, 7 (1909), No. 19, p. 811*).—This general review of the subject is accompanied by a bibliography of the more important literature.

The development of a piroplasm and trypanosome of cattle in artificial culture media, E. MARTINI (*Ztschr. Hyg. u. Infektionskrank., 64 (1909), No. 3, pp. 385-391, pls. 4, figs. 2*).—This account has been substantially noted from another source (E. S. R., 21, p. 784). A bibliography of 23 titles is appended.

The development of Hæmoproteus orizivoræ n. sp., G. ANSCHÜTZ (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 51 (1909), No. 6, pp. 654-659, pls. 2*).—This new species was taken from the ricebird or padda (*Spermestes orizivora*).

FOODS—HUMAN NUTRITION.

The bleaching of flour and the effect of nitrites on certain medicinal substances, W. HALE (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 68, pp. 44*).—The natural and artificial bleaching of flour, the changes which take place in the flour, the effects produced by different amounts of nitric oxid gas under laboratory conditions, and similar matters are considered, and the results of an experimental study reported in which artificial digestion experiments and digestion experiments with small animals were made.

Sodium nitrite and its action on other drugs was also studied with small animals, the amount used being greatly in excess of that found in bleached flour. The author believes the results are nevertheless suggestive. The results of the experiments were summarized as follows:

"The gluten of unbleached flour of the same grist is more easily digested by an artificial gastric juice than that of flours bleached with varying amounts of nitrogen peroxid.

"Sodium nitrite, when added to an artificial gastric juice in a strength of 1 part to 5,000 to 200,000 (40 to only 1 part of nitrogen per 1,000,000), lessens its proteolytic action from a marked to a just determinable degree.

"Alcoholic extracts made from slightly to markedly overbleached (overtreated) flour are toxic for white mice and rats when given subcutaneously. Alcoholic extracts of unbleached flour prepared in the same way are not toxic.

"Alcoholic extracts of slightly to markedly overbleached (overtreated) flour are devoid of any marked toxic action on rabbits when given per stomach. Those from overtreated flour caused a somewhat more marked diminution in weight in one series, a negligible decrease in another.

"Sodium nitrite, even in very dilute acid solution (up to 1 part to 20,000,000 or 1 part to 100,000,000 of nitrogen as nitrite) causes definite color and chemical changes in a large number of common medicinal substances.

"Sodium nitrite in dilute acid solution (up to 1 part to 20,000 or 1 part to 100,000 of nitrogen as nitrite) markedly increases the toxic action of a number of medicinal substances. In certain cases no effect is produced and in others the toxicity is lessened.

"The application of these results to the possible harmful effects of the artificial bleaching of flour suggests that a deleterious action does result because

of the lessened digestibility of the gluten of such flour, and possibly also because of the presence of definitely toxic substances, although these, it must be admitted, are present, even in overtreated flour, in only minute amounts.

"Independently of these factors, also, the bleaching process may produce harmful results on account of the presence in flour bleached by such processes of small amounts of the nitrites. This action is exerted in two ways—by a decrease in the rate of protein digestion and by changing other medicinal substances which may be taken at the same time into markedly toxic agents, or by decreasing their normal action, or possibly through the chemical change, altering entirely their therapeutic effects.

"That the nitrites may enter the stomach from other sources does not alter the fact that they act thus deleteriously, and that their ingestion should be decreased as much as possible and, when other drugs are given, as absolutely as possible."

The digestibility of unbleached and of bleached flour, J. T. WILLARD and C. A. A. UTT (*Bul. Kans. Bd. Health, 6 (1910), No. 6, pp. 148–154*).—A summary of two series of experiments and detailed report of a third are given, the last including digestion by pepsin, by pancreatin, by a commercial diastase, and by saliva, 94 tests in all, made in duplicate.

"In no case has a comparison of the results shown any appreciable difference between bleached flour and the corresponding unbleached sample. In view of the uniformity of these results the conclusion seems unavoidable that flour bleached to the extent that our samples were is not altered in respect to rate of digestion."

The heat of flour, J. T. KELLY (*Austral. Baker, 14 (1910), No. 3, p. 25*).—Experiments with flour indicate that it has high latent heat.

Deterioration of Indian corn and its character, B. GOSIO (*Ann. Agr. [Italy], 1909, No. 261, pp. 38, pls. 24*).—This is an experimental study of the deterioration of corn meal, particularly by mold, and its possible relation to pellagra.

Statistics of the Swiss honey industry, H. SPÜHLER and A. BERTSCHINGER (*Schweiz. Bienen Ztg., n. ser., 33 (1910), No. 7, pp. 309–323*).—Statistical data are summarized

The value of fruit as food for man, M. RUBNER (*Deut. Obstbau Ztg., 1910, No. 16–19, pp. 240–247*).—The nutritive value of fruit, its importance from an economic standpoint, and related questions are considered in this summary of data on fruit and its use in the diet.

Edible wild plants of Nova Scotia, W. H. PREST (*Proc. and Trans. Nova Scotian Inst. Sci., 11 (1904–5), No. 3, pp. 387–416*).—This is a popular description of plants which have little commercial value, but which may be used for food in case of necessity.

Food analyses, C. F. JURITZ (*Rpt. Senior Anal., Cape Good Hope, 1909, pp. 134–146*).—This reports analyses of milk, cream, butter, milk powder, and miscellaneous foods and beverages.

[Analyses of miscellaneous food products], E. H. S. BAILEY and H. L. JACKSON (*Bul. Kans. Bd. Health, 6 (1910), No. 5, pp. 116–124*).—This contains analyses of samples of baking powders, milk, and other food products.

The Italian law relating to animal foods, E. CÉSARI (*Hyg. Viande et Lait, 4 (1910), No. 7, pp. 365–375*).—This is a discussion of the Italian law, and it is noted that the chief merit of the law is that it applies to all foods.

Nutrition and foodstuffs, H. BISCHOFF (*Ernährung und Nahrungsmittel. Leipsic, 1910, pp. 120, figs. 4*).—A brief and popular discussion of theories of nutrition, characteristics of the principal foodstuffs, and similar topics.

Food and feeding (*Brit. Med. Jour., 1910, Nos. 2563, pp. 388–390; 2564, pp. 453, 454*).—This is a brief exposition of some of the recent theories of human

nutrition. The no-breakfast plan, the fasting cure, the thorough chewing plan, vegetarianism, and low protein diet are discussed.

[Food of upper Yukon natives], F. SCHMITTER (*Smithsn. Misc. Collect., 56, No. 4, pp. 6, 7*).—The diet of these natives consists of fish, game, and berries, supplemented by vegetables bought at local stores. Until recently they lived exclusively on animal food, but now demand vegetable food. The Mackenzie River natives, on the contrary, live almost entirely on meat. The author states that they are robust and healthy.

Notes on the ration of Cuban workmen, H. FERRER (*An. Acad. Cien. Habana, 47 (1910), May, pp. 41–98, pl. 1, figs. 2*).—All parts of the island are considered in the author's study of dietary conditions in Cuba. In general he concludes that the average ration is improperly proportioned and poorly selected, and makes recommendations for securing a more economical diet.

According to the data which he summarizes regarding Cuban conditions, a typical man without work consumes a diet supplying 67.68 gm. protein and 1,708 calories of energy. The diet of a physician 32 years old, weighing 58 kg., supplied 88.50 gm. protein and 1,949 calories; the ration of a Cuban at moderate work 93.15 gm. protein and 2,326 calories; and the ration of a Cuban at severe work, 111.17 gm. protein and 2,778 calories. In the study of special diets he states that the ration of Cuban soldiers in time of peace supplies 147.9 gm. protein and 3,999 calories, and the ration of prisoners 76.2 gm. protein and 1,781 calories.

The possible relation between the high cost of living in cities and the high death rate from tuberculosis is discussed, as well as other topics which have to do with the general subject.

Manual for army bakers, H. G. SHARPE ET AL. (*War Dept. [U. S.], Off. Com. Gen. Doc. 358, pp. 89, figs. 14*).—This contains an outline of the chemistry of bread making, and describes the equipment and processes used in army post bakeries and also field baking and field bakery equipment.

Diet in training (*Med. Rec. [N. Y.], 78 (1910), No. 5, p. 194*).—A discussion of diet in training in which the author quotes from a paper read by H. I. Gillett before the Oxford Medical Society, June, 1910, to the effect that the majority of Oxford rowing men consume on an average 169 gm. protein daily. The possibilities of harmful results from the consumption of an excess of protein are considered.

"The point is how to discover what constitutes an excess of protein and to find out whether a hard and fast rule can be laid down with respect to the diet of athletes. Judging from experiments and tests which have been made up to the present time, it may be stated with emphasis that no arbitrary rule can be deduced from these and it seems likely that the diet of athletes must be regulated according to the idiosyncrasies of individuals under the direction of medical men or skilled trainers."

The action of sodium benzoate and benzoic acid on the human organism, C. A. HERTER (*[New York], 1910, pp. 18*).—In this publication the author replies to criticisms which have been made of the report of the Referee Board appointed to study the action of sodium benzoate, and gives reasons for his belief that the conclusions of this board are reliable and trustworthy.

The influence of oxygen inhalations on muscular work, L. HILL and M. FLACK (*Jour. Physiol., 40 (1910), No. 5, pp. 347–372, figs. 2, dgms. 3*).—A series of experiments on 12 subjects led to the following conclusions among others:

"The inhalation of oxygen lessens the discomfort of forced breathing. It enables young men with a great power of pulmonary ventilation to go on with forced breathing for as long as 10 minutes, and to wash the CO_2 out of the body till the alveolar tension sinks to as low as 1.47 per cent. . . .

"The ventilation power is much greater in the young student than in the middle-aged. . . .

"Oxygen inhalation enables the athlete to excel by making him able to stand a higher tension of CO_2. After deep breathing of oxygen and filling his lungs with the gas he can run 200 to 300 yds. without breathing, and this gives him a mechanical advantage. The beneficial effect is due partly to the oxygen in the body, and chiefly to that in the lungs.

"The effect of oxygen inhalation is almost entirely spent by the first period of exertion which follows the inhalation."

Select list of references on the cost of living and prices, H. H. B. MEYER (*Washington: Library of Congress, 1910, pp. V+107*).—This is a list of the literature of the subject contained in the Library of Congress, relating principally to conditions in the United States, although all important foreign countries are represented.

ANIMAL PRODUCTION.

Text-book of comparative physiology of domesticated animals, W. ELLENBERGER and A. SCHEUNERT (*Lehrbuch der vergleichenden Physiologie der Haussäugetiere. Berlin, 1910, pp. X+809, figs. 475*).—This text-boot has special value for teachers and investigators in animal husbandry through its résumés of recent work. Among the more important chapters are the following: The Chemical Constituents of the Animal Body, by A. Scheunert; Ferments and Their Effect in General, by W. Grimmer; The Blood, by H. Zangger and O. Zietzschmann; Circulation of the Blood, by A. Lohmann; Respiration, by W. Gmelin; Urine and its Secretion, by C. Porcher; Secretions of the Skin, by W. Kolmer; Milk and its Secretion, by H. Rievel; Special Secretions, by W. Hausmann; Functions of the Liver, by E. Abderhalden; Digestion, by W. Ellenberger and A. Scheunert; Assimilation and Resorption, by W. Gmelin; Metabolism, by O. Krummacher; Animal Heat, by J. Tereg; General Physiology of Muscles and Nerves, by A. Durig; Electrophysiology, by A. von Tschermak; Special Physiology of the Nerves, by H. Dexler; Locomotion, by O. Zeitzschmann; Sense Organs, by W. Ellenberger; Vision, by A. von Pflugk; and Reproduction, by W. Ellenberger.

The treatise also furnishes a foundation for work in applied zoology. Experimental methods are described and there are numerous references to the literature on comparative physiology.

A theory of Mendelian phenomena, W. J. SPILLMAN (*Amer. Breeders' Mag., 1 (1910), No. 2, pp. 113–125*).—The epigenetic theory of the development here outlined is stated to be consistent with Mendelian phenomena and is a restatement of the author's views, which have been noted from another source (E. S. R., 23, p. 172).

The new views about reversion, C. B. DAVENPORT (*Proc. Amer. Phil. Soc., 49 (1910), No. 196, pp. 291–296*).—Atavism is defined as the possession in an offspring of a grandparental trait not evident in the parent, while reversion is the reappearance of a trait of some more remote ancestor. The new explanation of reversion is based on the principle that unit characters are inherited from the germ plasm and not from the parent as a whole.

"In the great majority of cases atavism is a simple reappearance in one-fourth of the offspring of the absence of a character due to the simplex nature of the character in both parents.

"Reversion in the strict sense has a more complicated explanation. It depends in general on the circumstance that many apparently simple organs or color patterns or colors are really complex and require the cooperation of two or more elementary characteristics called factors. For generations a particular

character may not appear but when two parents together produce the required factors the combination may be an apparently new, compound character; which we find elsewhere only in remote ancestry."

Germinal analysis through hybridization, G. H. Shull (*Proc. Amer. Phil. Soc., 49 (1910), No. 196, pp. 281–290*).—A critical discussion of the significance of Mendelian phenomena. The author holds that the question of epigenesis versus preformation, as a fundamental difference between Riddle's views (E. S. R., 21, p. 374) and those of the Mendelians, is largely imaginary, and that Spillman (E. S. R., 23, p. 172) by proposing the term "teleone" does not dispose of unit characters but merely changes the terminology.

"The unit characters are real things capable of repeated demonstration. They are still differential characters, and possess the capacity to behave as units, entering into various combinations with other unit characters and capable of reextraction from them, or of being absent altogether, regardless of the manner in which their behavior is explained. The genes, on the other hand—the ultimate organs of the protoplasm or conditions of the protoplasmic substance upon whose existence depends the capacity to give certain series of reactions, or to pass through certain cycles of ontogenetic development—are purely inferential. . . .

"The most hopeful directions of approach in the effort to learn more of the true inwardness of the unit characters, are those of chemical analysis and experimental cytology. . . . While waiting for further information from the chemist and the cytologist, there is still abundant room for the work of the experimental breeder."

Cell division as a bipolar phenomenon of an electro-colloidal character, A. Gallardo (*Arch. Entwickl. Mech. Organ., 28 (1909), No. 1, pp. 125–156, figs. 9*).—To sustain his views the author assumes a negative electro-colloidal charge for the chrômatin and a positive one for the cytoplasm and centrosomes. A résumé is given of similar views that have been suggested by other investigators.

A bibliography of the subject is appended.

The plumage of crosses between guinea fowls, M. F. Guyer (*Bul. Mus. Nat. Hist. Nat. [Paris], 1909, No. 1, pp. 3–6, pl. 1*).—A hybrid, now in the museum of natural history in Paris, is illustrated and described.

The specimen in question resembles the domestic fowl more than the guinea. The plumage of this and other specimens which the author studied are sometimes atavistic, showing alternate light and dark chevrons, which is characteristic of *Polyplectron chalcurus* and *Agelastes meleagrides*. The author suggests that these markings may have constituted the primitive plumage of the pheasant family.

A new zebra hybrid, E. H. Riley (*Amer. Breeders Mag., 1 (1910), No. 2, pp. 107–110, figs. 3*).—An account of the work of the Bureau of Animal Industry of this Department in producing hybrids with the ass and Grevy zebra (*Equus grevyi*).

On the recognition of the individual by hemolytic methods, C. Todd and R. G. White (*Proc. Roy. Soc. [London], Ser. B, 82 (1910), No. B 557, pp. 416–421*).—"The immunization of the ox with the red blood corpuscles of other oxen gives rise to the formation of a hemolytic amboceptor in the blood of the immunized animals. The amboceptor so formed is an isolysin but not an autolysin. The race of the animal appears to have very little influence on the resulting hemolysins. The serum of an animal so treated acts very differently on the red blood corpuscles of different individual oxen. The sera of different individuals similarly immunized differ from one another in their action on the corpuscles of different individuals. . . . The red blood corpuscles of any indi-

vidual are thus characterized by a definite individuality of their own, and can be distinguished from those of any other individual of the same species."

Judging pedigrees, F. R. MARSHALL (*Breeder's Gaz.*, *58* (*1910*), *No. 8*, *p. 300*).—The author proposes a score-card method of arriving at the valuation of a pedigree, which takes into consideration both ancestry and the characteristics of the individual.

Grain farming or live stock? E. DAVENPORT (*Breeder's Gaz.*, *57* (*1910*), *Nos. 21*, *pp. 1228*, *1229*; *22*, *p. 1278*; *23*, *p. 1331*; *25*, *p. 1418*; *26*, *pp. 1460*, *1461*).—A series of articles containing an account of the work of the Illinois Station in exposing the fallacies that certain soils are hopeless and that other lands are inexhaustible. It is stated that because the investigations of the station have shown that the fertility of the land can be maintained either with or without live stock, the public has gained the impression that the station officials have advocated grain growing instead of stock farming, an assumption not warranted by the facts in the case.

Feeding-off experiments, W. ANGUS (*Jour. Dept. Agr. So. Aust.*, *13* (*1910*), *No. 12*, *pp. 1066*, *1067*).—With a view of testing the relative merits of several pasture crops, plats of 2 acres each were sown with barley, rye, rape, and a mixture of rye and rape, the whole being manured at the rate of 1½ cwt. of bone superphosphate per acre.

During the season of 1908–9, 166 sheep were pastured on the barley plat for an aggregate of 18 days, which is at the rate of 4.1 sheep per acre per year. On the rye, rape, and the mixture of rye and rape plats, there were carried the same number of sheep for 21, 25, and 22 days, respectively, or at the rates of 4.8, 5.7, and 5 sheep per acre per year, respectively.

During the following season 150 sheep were carried on the barley plat for 20 days, on the rye plat for 21 days, on the rape plat for 18 days, and on the mixture of rye and rape for 19 days, or at the rate of 4.1, 4.3, 3.7, and 4 sheep per acre per year, respectively.

Dried yeast as a feeding stuff, O. KELLNER (*Deut. Landw. Presse*, *37* (*1910*), *No. 53*, *pp. 584*, *585*; *Deut. Landw. Tierzucht*, *14* (*1910*), *No. 34*, *pp. 404*, *405*).—Two wethers were fed a ration of 750 gm. of meadow hay and 800 gm. of dried yeast per head per day. The yeast, which had been dried by a patent process, gave the following analysis: Water 11.8 per cent, crude protein 43.1 per cent, fat 0.5 per cent, nitrogen-free extract 36.3 per cent, fiber 0.2 per cent, and ash 8.1 per cent. The coefficient of digestible organic matter was 91 per cent and that of crude protein 90.9 per cent.

Rough rice as feed for horses and mules, W. H. DALRYMPLE (*Louisiana Stas. Bul. 122*, *pp. 3–8*, *fig. 1*).—Rations for 2 mules weighing about 900 lbs. each were compounded, gradually increasing the amount of ground rough rice at intervals until 8 lbs., or a little over, was fed to each mule per day. The basal ration consisted of cracked corn, cotton-seed meal, blackstrap molasses, and lespedeza hay. As the amount of rice was increased the cracked corn was decreased. Between April 25 and June 30 the mules consumed 5 sacks of rice. The general health and condition of the mules were excellent throughout the test, with the exception of 1 or 2 off days due to hot weather.

"When the prices of other cereal (feeding) grains are high, etc., and other conditions warrant, ground rough rice may be found of considerable economic value as a feed for horses or mules, if intelligently and systematically used."

Inspection of feeding stuffs (*New York State Sta. Bul. 324*, *pp. 53–142*). Analyses are reported of distillers' grains, hominy feed, gluten feed, cotton-seed meal, barley feed, buckwheat screenings, meat meal, beef scrap, shredded wheat waste, linseed meal, alfalfa meal, pea meal, provender, corn meal, corn-cob meal, corn bran, oil cake, dried beet pulp, force screenings, poultry feeds,

wheat offals, proprietary mixed feeds, dried brewers' grains, malt sprouts and malt germ. A change in the feeding stuffs law is also noted.

[Cattle in Alaska], C. C. GEORGESON and M. D. SNODGRASS (*Alaska Stas. Rpt. 1909, pp. 24–28; 62–65, pl. 1*).—An account of the work in progress in cattle breeding at Kodiak Station. "The summer conditions have been favorable to the herd. . . . The young stock has grown well, and all were sleek, lusty, and fat at the close of the season of pasture. The Galloways have proved themselves to be first-class rustlers. They can stand the climate well, they pay no attention to storms, their heavy coat of long hair protects them against cold, and there is no doubt whatever but that the Galloway is the breed for Alaska. . . . It is believed that by selecting the heifers which prove to be good milkers and breeding them for the milking quality and occasionally augmenting the number of milkers with purchases from outside, it will be possible in a few years to develop the milking quality, which has been systematically repressed in the breed for many years past, until a dairy strain will be secured without having sacrificed all of the qualities which go to make good beef cattle as well."

The daily ration of hay when fed alone was about 25 lbs. per head, and when hay and silage were fed together the daily ration was 10 lbs. of hay and 20 lbs. of silage, until about March 1 when the hay was cut off and silage was fed alone, the ration being increased to 45 lbs. of silage. All of this time the cattle ran on the beach, where they could get more or less kelp that was thrown up by the tide. Some cattle died of impaction of the third stomach as the result of eating half-rotten grass found on the beach. It is recommended that Iceland sheep and the yak be introduced and an attempt made to cross the yak with the Galloway cattle.

Indian cattle in the United States, A. P. BORDEN (*Amer. Breeders Mag., 1 (1910), No. 2, pp. 91–94, figs. 3*).—An account of a herd of 51 head of zebus imported from India to Texas in 1906. They were bred to Hereford and grade stock. The first crop of calves, at the time the article was written, was from 14 to 20 months old and had been kept in tick-infested pastures and with ticky cattle.

"This first crop of calves, about 300 in number, has grown upon the range as all our cattle and they are fully 50 per cent heavier than our ordinary range calves. They are as heavy as the calves a year older out of the same mothers, but sired by pure-bred Hereford bulls. The cross-bred animals are smooth, with very strong constitution, are good rustlers, of rapid growth, and are animals that have courage enough to look you in the face when you go about them. . . . It may be claimed for these cattle that they have the power of immunity from Texas fever. They stand a tropical and subtropical climate better than the other breeds of cattle. They have the power of transmitting the tick-resistant quality through several generations."

Sheep breeding, F. W. WILSON (*Arizona Sta. Rpt. 1909, pp. 570–572*).—An outline is given of the sheep breeding work at the station in mating native ewes with the Tunis, Oxford, Shropshire, and Rambouillet breeds. The Tunis-native ewes are said to be uniform in type, the cross is not troubled to any extent by the botfly, and possesses other desirable characteristics.

United States army horses and mules (*Breeder's Gaz., 58 (1910), No. 11, pp. 445, 446, figs. 2*).—An account of the types of cavalry horses and mules desired in the United States army.

During the last 2 years a successful attempt has been made to buy 3 and 4-year-old horses and mules unbroken and to break them while at the special remount stations. This reduces the first cost of stock and increases the average length of life by accustoming the animals to the army rations, while by breaking them at once to army ways they are more efficient and reliable. "The

colts last year cost about $15 less per head than the mature horses, and it is estimated that they will last from 2 to 4 years longer."

Draft horse judging, A. S. ALEXANDER (*Wisconsin Sta. Circ. Inform. 17, pp. 26, figs. 26*).—General directions for examining draft horses are given in this circular. A scale of points is presented, and instructions for scoring are described in detail. The difference between good and bad points is illustrated. The more common defects and vices are briefly noted.

Draft animals in the Philippine Islands (*Philippine Agr. Rev.* [*English Ed.*], *3* (*1910*), *No. 6, pp. 327–330*).—Attention is called to the decrease of draft animals in the islands. Suggestions are offered for increasing the supply to meet the demand necessary for the development of agriculture.

Poultry notes, R. PEARL and F. M. SURFACE (*Maine Sta. Bul. 179, pp. 65–124, pls. 5, figs. 5*).—This bulletin contains studies with hybrid poultry, a brief report of the progress of the work of the station in 1909, and also abstracts of technical papers published by the authors, which have been previously noted from other sources.

Details are given of the methods of feeding practiced at the station. The dry mash fed to pullets is less rich than that formerly fed, this change having been made so as not to force egg production in the fall. From September to December, inclusive, 300 Barred Plymouth Rock pullets laid 4,774 eggs.

Mangolds as a green food in winter have been given up and sprouted oats used instead. These are sprouted in a poultry house containing a hot water system and are fed when from 4 to 6 in. in height. Directions are given for keeping the poultry free from lice and for making a cresol disinfectant solution.

The following points regarding the hybrids of the first generation from reciprocally crossing Barred Plymouth Rocks and Cornish Indian Games are noted:

"The barred color pattern is found to be inherited in a sex-limited fashion, equivalent to a phenomenon of segregation in the F_1 generation.

"The percentage fertility of eggs is found to be much higher when the cross is made in one direction (B. P. R. ♂ × C. I. G. ♀) than in the reciprocal.

"The hatching quality of the fertile eggs is not found to be greatly different in the cross and its reciprocal. In both cases, however, the hybrid matings gave a much higher average percentage of fertile eggs hatched than did the pure matings.

"Study of the sex ratios indicate that proportionally more males were produced among the hybrid chicks than among those from pure matings. The difference in the sex ratios cannot, however, be regarded as significant in comparison with their probable errors.

"The mortality records show that the percentage mortality of hybrid chicks from Cornish mothers was about the same as that of pure Cornish chicks. Similarly the percentage mortality of hybrid chicks from Barred Rock mothers was about the same as that of pure Barred Rock chicks. The percentage mortality of all chicks whether hybrid or pure from Cornish mothers was somewhat greater than that of all chicks of corresponding matings from Barred Rock mothers.

"The hybrid pullets fall into two distinct classes in regard to winter egg production according to the direction of the cross. Hybrid pullets from Game mothers are relatively good layers, whereas hybrid pullets from Barred Rock mothers are relatively poor layers. A Mendelian discussion of this result is given.

"Shank and beak color are shown to be inherited in a sex-limited fashion as is the barred color pattern.

"The down color of the chicks is different in the F_1 hybrids from what it is in either of the pure breeds crossed.

"Dominance of pea comb over single is found to be far from perfect. The hybrids show a perfectly graded series of comb types ranging from the perfect single to the perfect pea condition.

"In shape of body the hybrid males are essentially like the pure Cornish Indian Game males. The hybrid females are intermediate in shape of body between the females of the two pure breeds crossed."

Inheritance of hatching quality of eggs in poultry, R. PEARL (*Amer. Breeders Mag., 1 (1910), No. 2, pp. 129–133*).—A report of the committee on breeding poultry of the American Breeders Association, in which the hatching quality of eggs and the method of selection according to breeding capacity are briefly discussed on the basis of data previously noted (E. S. R., 21, p. 773; 22, p. 571).

Poultry: Northwest Experiment Farm at Crookston, Minn., C. E. BROWN (*Minnesota Sta. Bul. 119, pp. 141–175, figs. 19*).—This bulletin treats in a popular manner of poultry houses and other appliances, breeds of poultry, feeding and management, killing and dressing poultry for market, and common parasites of poultry. Several experiments are also briefly reported, including a test of an advertised system for selecting hens with high egg production.

A lot of 50 Leghorn pullets fed on a dry mash from December 12 to February 12 laid an average of 18.2 eggs per day at an average cost of 7.3 cts. per dozen. During the same period a similar lot on a wet mash ration laid an average of 19.6 eggs per day, at a cost of 6.7 cts. per dozen. With lots of 100 hens each, Leghorns gave a total profit for four months of $39.10 and Plymouth Rocks of $52.94. On a ration of corn, oats, shorts, and skim milk 12 Plymouth Rock cockerels in 3 weeks' time made an average gain per bird of 2 lbs., at a cost of 4.35 cts. per pound. On a similar ration a lot of 12 Leghorn cockerels made an average gain of 1.18 lbs. per bird, at a cost of 4.9 cts. per pound.

The present state of poultry culture in Russia, B. P. GONTSHAROFF (*Farm Poultry, 21 (1910), Nos. 1, pp. 1, 2; 2, pp. 37, 38; 5, pp. 145, 146, figs. 4*).—The fowl most common in Russia is a small scrub that averages per year only about 60 to 70 eggs per hen, though it is hardy and matures very quickly. Among the best distinctive breeds mentioned are the Orloff and Pavloff fowls and the Arsamass, Holmogor, Toola, and Sebastopol geese. The Orloff is a game type, though not used for that purpose. It is a heavy breed with a long, deep breast bone; the comb is small, and the color of the skin and legs is deep yellow. There are speckled, red, pile, and white varieties. The Pavloff is a small, fancy breed, gold or silver spangled, with a large crest and feathered legs. The meat qualities are indifferent.

Recent investigations have proved that the Holmogor goose is a better breed than the Embden. The Toola game geese were formerly used in the pit, and like all fighting varieties have a well developed breast bone, giving plenty of meat. They are esteemed as a cross with the Toulouse, which gives an improved quality of flesh. There are no special Russian breeds of ducks, the common variety being little better than a wild Mallard. Their merit consists in being hardy and they find most of their own food themselves. The meat is dark in color and when fatted furnishes an abundance of outside fat. Turkeys are numerous in some localities and guinea fowls are bred in large numbers in southern Russia. The Caucasian and Turkestan varieties of pheasants are hardy in northern Russia and do not require special care. They are much superior to the Bohemian and the domesticated varieties of western Europe. Many foreign breeds of fowl have been imported.

Goats are kept to supply milk for fattening fowls, which is accomplished largely by old-fashioned methods, though there have been some improvements in recent years. "All birds are usually fattened on thin porridge, mostly bar-

ley meal, with addition of suet, tallow, and plenty of skim milk. The price for lean chickens, as bought by these farms, is 20 to 25 copecks a pound (10 to 13 cts. a pound) live weight, the selling price for dead fattened 'poulardes' being not under 50 copecks a pound (25 cts.), going sometimes up to 1 ruble (0.515 cts.) a pound, which makes the price for a good specimen about 4 to 8 rubles ($2.06 to $4.12) apiece."

The sporting element has been influential in developing the poultry industry in Russia, but the direction followed has been as a rule toward utility rather than special fancy. Poultry associations and poultry courses in schools and colleges are doing much to promote poultry culture. Cooperative societies have been formed for the purpose of marketing poultry and other farm products.

How to kill and bleed market poultry, M. E. PENNINGTON and H. M. P. BETTS (*U. S. Dept. Agr., Bur. Chem. Circ. 61, pp. 15, figs. 5*).—This circular was prepared to assist dressers of poultry to improve the quality of market stock by correct methods of killing and bleeding. The details presented are the preliminary results of a study which will include all branches of handling, storing, and marketing dressed poultry.

"A very large proportion of the unsightly poultry in our markets, aside from the rubbing and tearing of the skins, is caused by an incomplete removal of the blood. . . . At least 30 per cent of all the poultry coming into the New York market is incompletely bled. Much of it is so badly bled that it results in a loss of from 2 to 5 cts. a pound."

The anatomy of the skull, position of the neck veins, and the correct position of holding the fowl to make the cut are illustrated and briefly described. The cut should be made on the right side of the roof of the chicken's mouth, just where the bones of the skull end. The operation calls for accuracy rather than for strength. The blade of the knife should be about 2 in. long and ¼ in. wide and of a heavy piece of steel so that it will not bend. "Brain for dry picking by thrusting the knife through the groove which runs along the middle line of the roof of the mouth until it reaches the skull midway between the eyes."

Tricks of the poultry trade, R. V. HICKS (*Topeka, Kans., 1910, 2. ed. rev., pp. 61, figs. 15*).—A brief popular work on the breeding, feeding, and management of fowls.

DAIRY FARMING—DAIRYING.

Officials, organizations, and educational institutions connected with the dairy interests, 1910 (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 162, pp. 31*).—This circular explains the nature of the work of the Dairy Division, and contains lists of state dairy officials, state, national, Canadian, and international dairy associations, city milk producers' associations, city milk dealers' associations, courses in dairying offered by the state agricultural colleges, and lists of medical milk commissions in the United States and Canada, and of associations of breeders of purebred dairy animals.

The composition of milk fat as affected by a ration containing beet leaves, M. SIEGFELD (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 4, pp. 177-181; abs. in Milchw. Zentbl., 6 (1910), No. 8, pp. 381, 382*).—Physical and chemical constants are reported of butter made from the milk of cows fed a ration of beet leaves, with wheat and barley straw during the latter part of the lactation period. The Reichert-Meissl, saponification, and Polenske numbers were very high. The iodin number and the molecular weight of the nonvolatile acids were low. After the feeding of beet leaves ceased there was a return to normal conditions.

Contribution to the knowledge of a beet-leaf ration on the composition of milk fat, M. Fritzsche (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 9, pp. 533–536; abs. in Milchw. Zentbl., 6 (1910), No. 8, pp. 382, 383*).—Analyses were made of butter from the milk of cows fed a ration containing fresh beet tips and beet leaves. The results were similar to those obtained by Siegfeld, noted above.

The insoluble barium number (Avé-Lallemant's method) was unaffected, but the soluble barium value was raised from 10 to 20 units, as is the case when coconut fat is added to butter. The Hanus-Stecklester value, on the contrary, was unaffected by feeding beet leaves. Hence, by means of these 2 tests butter adulterated with coconut fat can be distinguished from pure butter made from milk of cows fed a ration containing beets or beet leaves.

[A nonsuction milking machine], J. H. Monrad (*Hoard's Dairyman, 41 (1910), No. 32, p. 935, figs. 3*).—A brief description of an improved form of Nielson's milking machine, which consists of 2 sets of curved aluminum plates covered with a removable rubber sheet on the side toward the teats. The plates are mounted in an iron frame and are set in motion by 2 flexible shafts so that the plates are moved against each other in such a manner as to press the teats first above and then gradually downward. The plates may be regulated even while in motion to suit various sized teats. The frame of the plates is hung in a box, from which a tube conducts the milk into the pail hung farther forward on the cow. The whole weight is from 4½ to 5½ lbs. The flexible shafts are connected with a fixed shaft above the stalls carrying suitable eccentrics, whereby the desired motion is obtained. The fixed shaft may be turned by hand or power. The flexible shafts are easily removed from stall to stall by a handle with a spring catch. The machine may also be used in the fields.

"The machine is plain and simple in construction, easily taken apart and cleaned and reserve parts replaced and may be repaired by any handy blacksmith; the plant should not be expensive and hence this machine should be available for the small herds."

A milk preserving machine (*Jour. Bd. Agr. [London], 17 (1910), No. 5, p. 412*).—A brief note on a French patent of a machine for preserving milk by subjecting it to a high pressure and then pasteurizing.

Report upon an epidemic of scarlet fever in London and Surrey due to an infected milk supply in June, 1909, W. H. Hamer and T. H. Jones (*Abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 4, pp. 363–377, fig. 1*).—The outbreak of scarlet fever was traced to a single farm, and in the opinion of the authors the infection was not from a human source but from cows which had eaten infected cake.

Milk-borne scarlet fever (*Jour. Compar. Path. and Ther., 22 (1909), No. 4, pp. 340–348*).—A criticism of the report noted above. "The explanation put forward in the report requires previous assent to several things which are not only unproved but highly improbable. Most of these improbabilities have already been noticed, but the greatest of them is that the disease of human beings which is termed scarlet fever is communicable to cows, and is manifested by an eruption on the udder and teats."

Bibby's book on milk (*Liverpool, 1910, sect. 2, pp. 37–96*).—A résumé of the English milk law, with quotations of some typical and important cases where dealers were prosecuted for selling adulterated milk. Subjoined to the above are abstracts of the milk investigations, which have been previously noted from other sources.

Some creamery problems and tests, L. M. Davis (*California Sta. Circ. 54, pp. 14*).—This circular is intended to present in a brief manner a few creamery

problems and suggestions, for the purpose of reminding the creamery man of essential matters concerned in the manufacture of a uniform product. The topics treated are the factors that influence the overrun, making starters, coloring and salting, and testing for acidity and moisture.

Creamery butter, C. LARSEN, T. H. LUND, and L. F. MILLER (*South Dakota Sta. Bul. 122, pp. 699–730, figs. 6*).—This bulletin, which is a continuation of work previously noted (E. S. R., 22, p. 579), reports an investigation on the factors affecting the acidity of creamery butter, and discusses the acidity test as a measure of the deterioration of creamery butter. Suggestions are offered on handling cream and cream separators.

The factors affecting the acidity of butter which were studied were the amount of washing the butter, the pasteurization of cream, the amount of salt in the butter, the acidity of the cream, and the temperature at which the butter was held. The average acidity of the thoroughly washed butter when made was equivalent to 0.3 cc. of tenth-normal alkali per 10 gms. of butter, less than that of little washed butter. At the end of 16 weeks this difference had increased only to 0.5 cc. It is stated that these results should not lead one to believe that it is not essential to wash thoroughly butter made from hand-separated cream, as this is of great importance in order to remove undesirable flavors, lessen the danger of mottles, and produce a clear brine in the butter.

"The butter made from the pasteurized cream did not increase in acidity as rapidly as did the butter made from raw cream. The average difference when made amounted to only 0.1 cc., but after the butter had been kept 16 weeks, this difference had increased to 1.1 cc. During the 16 weeks the acidity of the pasteurized cream butter had only increased 0.6 cc., as compared with an increase of 1.6 cc. in the raw cream butter."

"The average increase in the acidity of low salted butter during the 16 weeks is 4.7 cc., while the average increase in the acidity of the highly salted butter is only 1.6 cc., the former being about three times as great as the latter. The longer time the butter is kept the greater is this difference."

"The average difference in the acidity of the high and low salted butter when fresh is 0.2 cc., and the average difference when 6 weeks old was 3.3 cc."

"The average results show that the butter made from the ripened cream, immediately after churning, contained 1 cc. more acid than did the butter made from the sweet cream. At the end of the 16 weeks the ripened cream butter contained 1.4 cc. more acid than did the sweet cream butter. During the whole 16 week period the acidity of the butter from the ripened cream increased 2.2 cc., while the acidity of the butter from the sweet cream increased only 1.8 cc."

"These results indicate that butter from fresh and properly ripened cream not over one day old keeps better than does butter made from sweet cream. The butter fat from very fresh cream is apparently in a more stable condition than is the fat in the sour cream over one day old, and not so predisposed to decomposition. It indicates that butter fat, in the form of butter, keeps better than does butter fat in the form of cream, even though it be in properly ripened cream."

The butter kept at 50 to 60° F. gained 6.4 cc. in acidity during the 12 weeks, while the butter kept at 70 to 80° F. gained 10 cc. Butter kept 16 weeks was tested at intervals of 4 weeks and compared with a score as estimated by a competent judge.

"During the whole 16 week period the butter was kept there was an average decrease in quality of the butter of 11.4 points, and an average increase in acidity of 1.64 cc. This equals 0.144 cc. increase in acidity to one point decrease in the score. . . . The acid test gives practically the same results in

the hands of different men, while if the butter is scored according to the senses, there likely will be as many different scores as there are judges; even the same judge will place a different score on the same butter when successively judged.

"Considering the inaccuracy of the scoring, and the certainty of the acid test, the latter is the most satisfactory in measuring the keeping property of butter, and it is reasonably accurate to allow one point decrease in score for each 0.15 cc. of increase in acidity by the ether-alcohol method. If under certain conditions there should be a change in any of the other characteristics of butter, proper explanation can be made of same in the form of remarks."

Butter shrinkage, F. W. CULBERTSON ET AL. (*N. Y. Produce Rev. and Amer. Cream., 30 (1910), No. 18, pp. 662–664*).—A symposium by several practical butter makers on the causes of and best means of preventing shrinkage in shipping tub butter.

Butter and oleomargarine, G. L. MCKAY (*Hoard's Dairyman, 41 (1910), Nos. 32, pp. 940, 941; 33, pp. 965, 980*).—Details are given of the methods of manufacturing oleomargarine and comparisons are drawn between the properties of oleomargarine and butter.

The production of volatile fatty acids and esters in Cheddar cheese and their relation to the development of flavor, S. K. SUZUKI, E. G. HASTINGS, and E. B. HART (*Wisconsin Sta. Research Bul. 11, pp. 127–154*).—A study of the nonnitrogenous products found during the normal period of Cheddar cheese.

Normal and skim milk Cheddar cheese was made August 1, 1908, and cured at 55° F. Lactose disappeared in from 3 to 6 days but the lactic acid did not disappear during the entire curing process. "The amount of it appeared to fluctuate somewhat, but in the whole-milk cheese even at the end of 10 months, 88 per cent of that present at the time of the initial analysis still remained. In the case of the skim-milk cheese, during the latter part of its history, lactic acid had largely disappeared.

"The initial source of the lactic acid in the cheese is, of course, lactose; but the unmistakable increase in the amount of this body in both cheeses up to the end of 3 months and after all lactose had disappeared, raises the question of additional sources of this body during the curing process."

"The usual form of lactic acid found in Cheddar cheese is racemic. However, solutions of lactose, inoculated with *B. lactis acidi* or a starter, produced active acid, but when inoculated with a bit of cheese, a mixture of active and inactive acids was produced. Further investigation is necessary to explain this phenomenon.

"No enzym capable of producing lactic acid or volatile fatty acids from lactose could be isolated from cheese. There are present in cheese a group of acid-forming organisms which produced no lactic acid in pure culture on a lactose solution, but yielded volatile fatty acids. In the skim-milk cheese the amount of volatile acids is higher than in the whole-milk cheese, probably due to the larger proportion of milk sugar in the curd, and was equivalent to 21.6 cc. N/10 acid at 3 days; this increased to 62.29 cc. at 6 weeks, 105.7 cc. at 3 months, and then decreased at the end of 5½ months to 84.2 cc. When we consider the individual acids, it will be seen that each had its own particular curve.

"Acetic and propionic acids reached a maximum at 3 months and then decreased, while butyric and caproic acids continually increased during the experimental period covered. Formic acid was only detected in the whole milk cheese at the 5½ months stage. Valerianic acid was never obtained."

"The fact that butyric acid was found in but small amounts during the period of direct lactose fermentation in the cheese, and caproic acid not at all, makes it probable that lactose was not the mother substance of these two

acids, and further, that the organisms of the *B. lactis acidi* type were not responsible for the production of these two higher acids found in the curing cheese mass."

"The principal source of acetic and propionic acids was probably lactates. Traces may have had their origin in protein decomposition, or further fermentation of glycerin.

"The principal source of butyric and caproic acids was fats and proteins." The authors do not claim, however, that proteolysis was an important source of the volatile fatty acids.

"Succinic acid was isolated from curing Cheddar cheese and identified from its silver salts." The first steam distillate neutralized, redistilled, and designated as "flavor solution" contained alcohols and esters.

"The 'flavor solution' from the mild whole-milk cheese contained esters made up largely of ethyl alcohol and acetic acid, while from the more pungent skim-milk cheese the esters were largely compounds of ethyl alcohol and caproic and butyric acids. The alcohol probably had its origin in the lactose fermentation and appears to be an important factor in flavor production."

"It is important for clearness that we distinguish between taste and the aroma, the latter cognizant only through the sense of smell, and by which the quality of cheese is much more largely judged. In how far these esters characterize the taste and typify it for different varieties of cheese is, of course, impossible at present to state. In this connection, it is more than probable that the nitrogenous end-products also play an important part."

[The cheese industry in Corsica] (*Daily Cons. and Trade Rpts.* [*U. S.*], *13* (*1910*), *No. 55, p. 718*).—The British consul at Corsica reports that sheep breeding is considered one of the most remunerative branches of agriculture, owing to the fact that the firms engaged in making Roquefort cheese have during the last 10 years established themselves in the island and now possess 45 cheese dairies in various parts. They remain in the country 6 months every year, paying for the milk at the rate of 25 centimes per liter (about 4.6 cts. per quart). The price of sheep during this period has risen from about $1.50 to about $3 per head. The cheese when made is sent to Roquefort to mature. After the Roquefort people leave the island in spring the farmers make the Corsican cheese, which finds a ready market owing to the fact that up to this period, since all the milk has gone to the Roquefort firms no Corsican cheese has been made, the market is not overstocked.

Some analyses of ghee, E. P. Bolton and C. Revis (*Analyst, 35* (*1910*), *No. 413, pp. 343–346*).—The Bombay adulteration of ghee act defines ghee as a substance made exclusively from butter fat from which the water is evaporated by heat and containing no admixture of any substance not derived from the milk of the cow, buffalo, goat, or sheep.

The milk, which in most cases is obtained from the buffalo, is boiled immediately after milking for from 1 to 3 hours in earthen pots. When cooled it is inoculated with sour milk and when curdled is churned with a split bamboo. After an hour's churning hot water is added and the churning continued until the butter forms. The butter is skimmed off and kept until it becomes somewhat rancid, when it is heated in an earthen pot and boiled until practically all the water present is evaporated. It is then allowed to clarify and the clear fat run while warm into jars. It is used by natives for every conceivable culinary purpose and is also consumed alone as a food material. As sold in the open market ghee is often undercooked in order to minimize the loss in weight during boiling. The loss generally amounts to 25 per cent of the original mass. One pt. of buffalo milk produces on the average 3 oz. of ghee, while cow's milk only gives about half this quantity.

"Ghee, as clarified milk fat, must be carefully distinguished from so-called Indian butter, which contains the other usual milk constituents, and accordingly keeps badly. . . . The nomenclature of this subject, as stated above, has been confused on account of the application of the term 'ghee butter' to the vegetable fat obtained from the seeds of the *Bassia butyracea*." Both animal and vegetable fats are used to adulterate ghee. The vegetable substances used in this connection include coconut, ground-nut, cotton-seed, safflower, poppy-seed, sesame, and niger-seed oils. Mahua, salvadora (kharkan fat), and castor oil are also sometimes used but are considered injurious. Physical and chemical constants of several samples of ghee are given.

VETERINARY MEDICINE.

Handbook of serumtherapy, edited by A. Wolff-Eisner (*Handbuch der Serumtherapie. Munich, 1910, pp. VIII+408, pl. 1, charts 9*).—This work, which is the forerunner of a series to be published, is divided into a general and a special part.

The general part considers antitoxic and bactericidal sera, active immunization, and hypersusceptibility. Among the subjects treated in the special part are the serumtherapy of diphtheria, tetanus, snake venom, dysentery, typhoid, and protozoan diseases, autoserumtherapy, staphylococcic, antistreptococcic, antimeningococcic, anthrax, cholera, Deutschmann, and hay fever serums, eclampsia, vaccine therapy, principles of modern antiferment serum treatment, principles of chemotheraphy, serum treatment of malignant tumors, therapeutics, the significance of Wassermann's reaction, and the specific treatment of tuberculosis.

Serobiological behavior of sexual cells, W. P. Dunbar (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 4 (1910), No. 6, pp. 740–760*).—Male and female sexual cells in the same type of plant or animal behave serobiologically among themselves like nonrelated types. The same holds good in regard to the other tissue of the same animal or plant.

Serologic studies with the aid of the optical method, E. Abderhalden and L. Pincussohn (*Ztschr. Physiol. Chem., 66 (1910), No. 1–2, pp. 88–105, charts 37*).—The authors believe from the results obtained that possibly each microorganism has a typical breaking down process for synthetically prepared polypeptids of known constitution. Tests were conducted with the serum of glandered animals and extracts of the glanders bacillus, diphtheria toxin and antitoxin, antistreptococcic serum, pyocyanase, ricin, cobra venom, and yeast press juice.

Serologic investigation with variola vera, Dahm (*Centbl. Bakt. [etc.], 1. Abt., Orig., 51 (1909), No. 2, pp. 136–138*).—Serum from cases of variola vera produced a complete inhibition of hemolysis. The antigens used were animal lymph and spleen and liver extracts.

Subcutaneous reaction of rabbits to horse serum, J. H. M. Knox, W. L. Moss and G. L. Brown (*Jour. Expt. Med., 12 (1910), No. 4, pp. 562–574*).—"Anaphylaxis or allergy of rabbits against horse serum can be proved by subcutaneous test. . . . Undiluted horse serum was used for most of the experiments. The amount injected varied from 0.01 cc. to 1 cc. The reaction seemed as definite after 0.01 cc. as after a larger quantity.

"The specific reaction appears in from 12 to 24 hours after the test is made and reaches its maximum in from 24 to 36 hours. It consists of a local swelling extending from 0.5 to 2 cm. from the point of inoculation. The skin involved in the raised area is usually red and hotter than the surrounding skin. Macro-

scopically and microscopically the reacting area has the appearance of a local acute inflammation.

"The altered reactivity (allergy) or hypersusceptibility (anaphylaxis) sets in usually in from 10 to 15 days after the first injection of horse serum, and lasts at least 3 months. Individual rabbits show marked variation from the average time of the development of anaphylaxis. The appearance of precipitins against horse serum in the blood of rabbits appears nearly synchronously with the allergic condition. After large injections of serum the allergic rabbits still react subcutaneously. A suppression of allergy which would correspond to the so-called antianaphylaxis could not be proved. Also in regard to the offspring of injected rabbits the subcutaneous test was not positive. The young of these rabbits did not develop a more active allergy than the young of normal rabbits. Neither the injection of considerable quantities of horse serum nor the development of a marked local reaction in the skin after intradermal inoculations of horse serum in a sensitized rabbit is accompanied or followed by greater variations in the number or types of leucocytes in the circulating blood than is found in control animals."

Studies upon anaphylaxis, with special reference to the antibodies concerned, J. F. ANDERSON and W. H. FROST (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 64, pp. 56*).—This work deals chiefly with a study of the anaphylactic antibody (termed allergin by the authors) for the purpose of studying some of the principles concerned in anaphylaxis. Particular attention has been given to the quantitative relations which exist between allergin and its specific antigen, and further to the relation of allergin to the conditions of hypersusceptibility, antianaphylaxis, and immunity.

The excretion of antitoxin and precipitinogen by the mammary gland with passively immunized mothers, SOHMA (*Monatsschr. Geburtsh. u. Gynäkol., 30 (1909), pp. 475–488; abs. in Hyg. Rundschau, 20 (1910), No. 11, p. 596*).—Tetanus antitoxin produced from horses was injected and from the results it is noted that antitoxin passes over in the milk in very perceptible amounts. It can easily be detected for 11 days but after 23 days the milk is free from antitoxin.

It was also possible to detect horse protein for a certain length of time serobiologically. The serum of the young which were nourished by the passively immunized mothers, in contradistinction from actively immunized mothers, contains no antitoxin and horse protein, or only traces.

The composition and some characteristics of the leucocytes, S. MANCINI (*Biochem. Ztschr., 26 (1910), No. 1–2, pp. 140–148*).—The results of analysis of horse leucocytes are given, with a method for obtaining them in a clean state. Also considered are the enzyms of the leucocytes and the behavior of these towards saponin and tetanus toxin.

On bactericidal substances extracted from normal leucocytes, H. ZINSSER (*Jour. Med. Research, 22 (1910), No. 3, pp. 397–433*).—The bodies extracted by freezing in salt solution and ordinary aqueous solution for normal rabbit leucocytes had a distinct bactericidal action for the *Staphylococcus pyogenes* and *Bacillus typhosus*. These bodies were thermostable at 56° C., but thermolabile at 75° and above. Reactivation by adding fresh leucocyte extract to extracts heated to 80° is not possible. On comparing the bactericidal power of these extracts with normal serum it is seen that quantitatively the latter far exceeds the former. Immunization did not increase the power of the leucocyte substance when *B. typhosus* was employed.

Biology of the phagocytes: Influence of the calcium ions on chemotaxis, H. J. HAMBURGER (*Biochem. Ztschr., 26 (1910), No. 1–2, pp. 66–84*).—Calcium enhances chemotaxis considerably; this it does both in vitro and in vivo.

Agglutination tests with normal bovine serum, W. SPÄT (*Centbl. Bakt. [etc.], 1 Abt., Orig., 54 (1910), No. 4, pp. 361–366*).—Adding normal bovine serum to a bacterial emulsion produces a flocculent precipitate. According to the author, this phenomena can be regarded only as agglutination and can not be considered a part of conglutination. Attention is thus drawn to the complexity of the agglutination process.

A change in the flagella during agglutination, G. KÜHNEMANN (*Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 4, pp. 355–360, pl. 1*).—The test shows that specific immune and normal serums in strong dilutions are capable of exerting an inhibitory influence on the flagella (tricolytic). This phenomenon usually goes hand in hand with the agglutination process, but this is not necessarily so.

A clinical method for estimating the antitryptic index, F. C. EVE (*Brit. Med. Jour., 1910, No. 2582, pp. 1540–1542, figs. 4*).—A description of a method for estimating the antitryptic index of blood, and devised for the purpose of controlling the size and frequency of the doses of vaccines. A case of pyelonephritis (with relapse) treated with tuberculin and coli vaccine is described for the purpose of illustration.

On the value of serums and vaccines in the treatment of disease, N. RAW (*Brit. Med. Jour., 1910, No. 2582, pp. 1538, 1539*).—The results of the author's experience with antistreptococcic, antitetanic, antidiphtheretic, Marragliano's, and antipneumonic serums, tuberculin, and vaccines.

The utility of the antilytic power of horse serum, F. C. EVE (*Lancet [London], 1910, I, No. 26, pp. 1753, 1754*).—A description of 3 cases of ulcer which were successfully treated by the local application of normal horse serum.

Bacterial nucleoproteids, A. LUSTIG and G. GALEOTTI (*Sperimentale, 63 (1909), pp. 777–812; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 7, p. 294*).—These are divided into (1) those which are characteristic of the various organs, (2) those with characteristics of the bacterial nucleoproteids in common, and (3) the nucleoproteids which are specific for certain bacteria. The biological actions of the first two categories are (a) coagulation, (b) the stimulation of the leucocytes, and other elements of the lymphatic system, (c) inhibitory action on the motile cells, (d) destructive and proteolytic action on the cells of the parenchymatous organs, and (e) pyogenic action.

The specific properties of the individual proteids studied were from the plague bacillus, cholera vibrio, *Bacterium melitensis* and *B. pyocyaneus*. The nucleoproteids can be used to advantage as vaccines, particularly where a far-reaching active immunity is desired, as in cholera, plague, and anthrax.

[Precipitin reaction for feces], M. WILENKO (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 1 (1909), No. 2, pp. 218–223; abs. in Hyg. Rundschau, 20 (1910), No. 11, p. 617*).—The author was able to prepare a specific precipitating serum for feces and from feces from different parts of the intestinal tract. The reaction is attributed to a specific protein substance which is evidently discharged into the lumen of the gut from the blood.

Nephrolithiasis and examination of nephroliths of some domestic animals, F. J. BOURMER (*Beiträge zur Nephrolithiasis und Untersuchung von Nephrolithen einiger Haustiere. Inaug. Diss., Univ. Bern, 1908, pp. 35, pls. 6*).—A discussion of the etiology, pathology, symptoms, and therapy of nephrolithiasis in domestic animals, and the results of the chemical analysis of nephroliths from bovines, horses, and pigs.

The extractive bactericidal substances of some bacteria which are antagonistic to the anthrax bacillus, N. PANE (*Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 5, pp. 457–461*).—The bacteria considered were *Bacillus pyocya-*

neus, Pneumococcus, *Staphylococcus aureus*, *B. typhosus*, and chicken cholera. The typhoid and chicken cholera bacteria extracts had no bactericidal action.

The author concludes as the result of his work with alcoholic and other extracts that the belief that lipoid substances are actively bactericidal is thus strengthened.

The use of the precipitation layer test for diagnosing glanders, MIESSNER (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 51* (*1909*), *No. 2, pp. 185–189*).—By placing a layer of glanders bacilli extract or one of Foth malleinum siccum (1:10) upon a serum from a glandered horse, a precipitation ring will be obtained which is specific.

About tetanotoxin and tetanoantitoxin, S. P. VON FEDOROW and P. C. IKONNIKOW (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 54* (*1910*), *No. 4, pp. 352–355*).—Tetanus toxin and tetanus antitoxin, prepared in a dry, pulverulent form, retained its specific characteristics for a period over 15 years. The minimum lethal dose of the toxin for white mice was 0.0005 gm., which is considered a high degree of virulence. The protective action of the antitoxin was also high in the powdered preparation. The author was able to show in vitro that the tetanus toxin could be destroyed by contact with the antitoxin, and that an animal can be protected against tetanus by injecting small doses of tetanus antitoxin if before the injection the toxin is mixed with the antitoxin.

General susceptibility in typhoid and colon infection as shown by the ophthalmic test, C. FLOYD and W. W. BARKER (*Pubs. Mass. Gen. Hosp. Boston, 2* (*1909*), *No. 2, pp. 740–748*).—The results are given of 93 clinical cases, 91 of which gave a positive reaction for typhoid fever.

Nearly all responded to Widal's test. In 24 control cases of subjects suffering from a variety of diseases other than typhoid the test was positive in 4 instances, these being tuberculosis cases. The eye test in the majority of cases appeared before the Widal reaction or before the blood culture test. Hamburger's test solution was used instead of Chantemesse's, as the latter was found inert. Good results were also obtained with the colon test solution prepared in the same manner.

The significance of the bacteria of the paratyphoid bacillus group in regard to the causation of human and animal diseases, HÜBENER (*Berlin. Klin. Wchnschr., 47* (*1910*), *No. 24, pp. 1099–1101*).—The author on the basis of his clinical findings shows that a marked difference exists in the mode of action of the typhoid and paratyphoid bacillus and results in a difference in the symptoms. He calls attention to the significance of the saprophytic nature of the latter bacillus, with particular reference to the diseases of the domestic animals and man.

Tuberculosis of animals, S. S. BUCKLEY (*Maryland Sta. Bul. 145, pp. 267–314, figs. 2*).—In this bulletin the author discusses the many phases of the tuberculosis problem, reviewing the present status of our knowledge of the disease, and the methods of combating it.

Tests made to determine the effect of vaccination upon young calves and the extent of immunity conferred have been summarized as follows: "These tests demonstrated that young calves vaccinated early in life had sufficient immunity conferred to enable them to resist a degree of infection sufficiently severe as to cause pronounced infection in untreated calves, when this exposure was incurred during the first year of life. The second test demonstrated that after 2 years the vaccinated animals failed to offer greater resistance to infection than was possessed by an untreated animal. The series of vaccinations showed the harmlessness of the treatment as far as the animals themselves are concerned, since no bad results were had in a total of 148 vaccination or 74 completed immunizations." The author considers immunization to be a justifiable procedure but

thinks that it should, for the present at least, be under the censorship of a proper state board in order that late vaccination, early breeding, and association with cows in milk, be not permitted.

It is pointed out that in selective breeding with an increased capacity in production as the principal object, the chest development has been a secondary consideration. Since this practice has tended to develop a more delicate type of cattle and to lessen the chest capacity, the aim in breeding must now be directed toward its correction. A system of stabling with the features of exercise, fresh air, and changing temperatures, which will tend to overcome this evil is advocated.

With the benefits obtained in human tuberculosis patients from the open air treatment in mind, a stable on this plan was erected at the Maryland Station several years ago which is here described and illustrated. This stable is of solid concrete construction with slate roof, the stabling portion being 36 by 58 ft. with an annex room 10 by 30 ft., outside measurements, for milking. The walls of the stabling portion of the building are of 12 in. solid concrete, but only 4½ ft. in height. On top of the outside wall are set 8 by 8 in. oak posts, properly placed for the support of the plates carrying the roof; the ordinary roof construction is used for closing in the top. This allows an open space 3 ft. 6 in. high around the entire building, with the exception of that occupied by the milking room. There is a double row of racks built across the stable which divides the room into 2 compartments, 23 by 34 ft. and 33 by 34 ft. respectively. The capacity of this stable is about 25 head of milch cows. The management of these differs from that of cows in closed stables. The cows are not tied, and are free to move about in the entire enclosure. Racks are kept supplied with the coarse feed, ensilage, roots, and similar feeds, to be consumed at will, and drinking water is accessible at all times.

The author finds that the milk records of cows kept in this stable during the winter months of 1909–10 show a decided increase in yield and that a reduction is not necessarily brought about by exposure to low temperatures, when these exposures are natural and constant.

The appointment of a state animal tuberculosis board is advocated.

The conversion of the human type of tubercle bacillus into the bovine type, A. Eber (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 15, pp. 317–323*).—On the basis of the results obtained with 3 out of 7 strains of human tubercle bacilli taken at random, it is evident that by passing the human type of tubercle bacilli through bovines a possibility exists of converting it into a type which has all the morphological and cultural characteristics of the bovine type and which, in addition, is highly virulent. The best point of dilection is found to be the abdominal cavity. In order to prevent the localizing of the organism in the abdominal cavity the author rubbed up the cultures with a tubercular spleen obtained from a guinea pig and bouillon.

Congenital tuberculosis in bovines, A. M. Bergman (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 52 (1909), No. 2, pp. 193–200, figs. 2; abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 46 (1910), No. 13–14, pp. 393, 394*).—During the years 1904 to 1908 the author observed 108 cases of tuberculosis, 4 of which were in the fetus and the remainder in animals which were at the most 3 days old.

In all of the fetal cases caseated areas were found in the portal lymphatic glands, and in one instance in the liver, mediastinal, bronchial, and left cervical glands. In another case the spleen, the internal abdominal wall, and several glands of the tibia had caseated foci.

In all the cases of new-born calves the portal lymphatic glands were tuberculous, while in one-half of the instances the mediastinal glands, and in one-third the bronchial glands, were infected. In a few cases the lungs and liver

were tuberculous. Congenital tuberculosis was found in 0.42 per cent, and from this the author concludes that congenital tuberculosis is relatively rare among bovines but occurs frequently enough to be given consideration in combating bovine tuberculosis.

The tonsils of the bovine and their relation to the production of tuberculosis, M. DEVRIENT (*Die Tonsillen des Rindes und ihre Beziehung zur Entstehung der Tuberkulose. Inaug. Diss., Univ. Bern, 1908, pp. 36, pls. 7*).—The work deals chiefly with the part played by the tonsils as avenues for infection, particularly for tuberculosis. The results of anatomical, histopathological, and bacteriological studies show that primary tuberculosis from tonsillar infection is a rare occurrence, the tonsils being as a rule infected secondarily and from the bronchial secretions.

A case of tuberculosis in the ass, E. CÉSARI (*Hyg. Viande et Lait, 4 (1910), No. 6, pp. 333–338, figs. 2*).—A complete statement of the pathological findings on autopsy in the case of tuberculosis in the ass. Tuberculosis in the ass is of rare occurrence.

The granular form of tubercle bacilli taking Much's stain, WEHRLI and KNOLL (*Beitr. Klinik Tuberkulose, 14 (1909), No. 2; abs. in Centbl. Bakt.* [etc.], *1. Abt., Ref., 46 (1910), No. 13–14, p. 397*).—The authors were able to obtain material which took both the Much and Ziehl stain, but there were a few bacteria which could only be identified with Ziehl's stain. In 50 per cent of the cases the bacilli only took Gram-Much's, and from this finding the authors conclude that the older methods alone will not suffice for the detection of tubercle bacilli.

The diagnosis of tuberculosis in animals by the conjunctival and cutaneous reaction, F. HAAG (*Untersuchungen über die Feststellung der Tuberkulose nach conjunctivaler und cutaner Einverleibung von Tuberkulin. Inaug. Diss., Univ. Bern. 1908, pp. 47*).—As a result of testing numerous sheep and bovines with the cutaneous test and utilizing various strengths of old tuberculin, the author concludes that the test, owing to its unreliability, is of no practical value for animals. The ophthalmic test in a number of instances gave positive results in sound animals. Precautions must therefore be taken in pronouncing an animal tubercular on the basis of this test. Neither the cutaneous nor cunjunctival test gave a rise in body temperature.

The diagnostic and prognostic value of opsonic investigations with tuberculosis, FORNET and KRENCKER (*Arch. Klin. Med., 97 (1909), No. 3–4; abs. in Centbl. Bakt.* [etc.], *Abt., Ref., 46 (1910), No. 13–14, pp. 415, 416*).—The authors investigated 35 definite clinical cases of tuberculosis, 17 of which were suspected of being tubercular and 48 of which exhibited no evidence of tuberculosis. From the findings it is concluded that the opsonic index estimation is of great value in diagnosis but of no value in regard to prognosis.

Ophthalmo reaction with bovotuberkulol and tuberculin brut, L. OPALKA and A. DÜRING (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 3–4, pp. 270–281*).—A description of the new method of utilizing tuberculin (bovotuberkulol D. I, 50 per cent solution and tuberculin brut) for the diagnosis of tuberculosis, the results therefrom seeming to furnish concordant results. Each reaction having a purulent secretion after a period of from 10 to 18 hours after the injection is considered positive. The intensity of the reaction stands in no relation to the age or degree of the diseased condition. The reaction is purely a local one.

Tuberculin diagnosis with simultaneous metabolism experiments, SAATHOFF (*München. Med. Wchnschr., 56 (1909), No. 40, pp. 2041–2047; abs. in Centbl. Bakt.* [etc.], *1. Abt., Ref., 46 (1910), No. 13–14, pp. 411–413*).—The author describes a simplified von Pirquet test. It is shown that most subjects

treated with tuberculin take on weight, this being due to an increase in the water content of the body and, further, to changes in the metabolism of the mineral matter. Very positive von Pirquet reactions and rapid weight reaction forecast a favorable prognosis.

Bérnaeck's tuberculin and its method of application, E. Béraneck (*Edinb. Med. Jour., n. ser., 3 (1909), No. 6, pp. 522–533; abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 46 (1910), No. 13–14, p. 427*).—This tuberculin contains an exo- and an endo-toxin, and when injected acts similar to a vaccine. The tuberculin is generally injected subcutaneously, but when possible, as for instance in surgical cases, should be injected directly into the tubercular foci.

The diagnostic value of tuberculin for tuberculous hens and turkeys, Klimmer and Saalbeck (*Ztschr. Tiermed., 14 (1910), No. 3, pp. 222–239*).—As the result of 114 thermal tuberculin tests, 270 ophthalmic reactions, and 282 cutaneous reactions with various tuberculin preparations (tuberculinum hominis, bovis and avis, bovotuberkulol, tuberculinum siccum humanum and bovinum) with tuberculous and nontubercular hens and turkeys infected with human and bovine tubercle bacilli, the author concludes that the tuberculin preparations mentioned can not be employed for diagnosticating tuberculosis in domestic fowls.

Further investigations in regard to immunity against tuberculosis, with a contribution to phthisisogenesis, Römer (*Beitr. Klinik Tuberkulose, 13 (1909), No. 1, pp. 1–63; abs. in Ztschr. Tuberkulose, 16 (1910), No. 1, pp. 77, 78*).—The treatment of guinea pigs with dead and living virulent tubercle bacilli gave no immunity. With chronic tubercular guinea pigs, however, immunity against a second massive infection was practically produced, but the stimulation of this second infection predisposed to cavity formation in the lung. The same results were also obtained with sheep and bovines.

Are tubercular animals immune toward their own tubercle bacilli? E. Joest (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 3–4, pp. 256–264*).—A criticism of Römer's conclusions (see above) from the findings obtained in the pig and bovine. The author concludes that the tissues of a tubercular animal do not possess any increased immunity toward "tubercular metastatic auto-infection (hæmatogenous and lymphagenous varieties)."

Experimental investigations about tuberculosis immunity, P. H. Römer (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 6, pp. 393–405*).—A polemical article (see above), giving the results of four experiments with sheep, two of which were reinfected with markedly virulent tubercle bacilli after a period of about 8 months. The other two animals were sound and from a flock free from tuberculosis and were given an initial dose of the tubercle bacilli. The results on autopsy showed that a certain degree of immunity against a second infection is possessed by the reinoculated animals.

Remarks in regard to Römer's experimental work in reference to tuberculosis immunity, E. Joest (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 6, pp. 406–408*).—The author holds that Römer in his work (see above) has furnished proof in regard to an additional infection but none for a "metastatic auto-infection."

Antituberculous vaccination in the ox, S. Arloing (*Vet. Jour., 66 (1910), No. 420, pp. 315–325*).—These vaccination tests were made with 60 bovines at least 4 months old and not over a year, and with attenuated human and bovine tubercle bacilli which were capable of being transmitted through successive cultures, had good viability, and did not produce tuberculosis in the animal when doses of from ½ to 1 cc. were given. The injections were made intravenously, subcutaneously, and per the digestive tract.

The autopsies with the above animals brought out the fact that no lung lesions were produced in the animals inoculated originally subcutaneously by inoculating intravenously thereafter, but a tuberculous infiltration could be noted in the mediastinal glands or bronchial glands, or in both. Varied results in regard to local subcutaneous foci in the subscapular gland were obtained.

The author draws attention to the fact that such an artificial immunity is only relative and not absolute. Of the animals treated with bovine tubercle bacilli 50 per cent gave complete success (macroscopically no lesions), 25 per cent relative success (those which showed circumscribed lesions being caseocalcareous either in one or few glands), and 25 per cent failure (extensive tuberculosis, which was sometimes fatal). The controls in this group gave of completely infected animals 63.6 per cent, partly infected 27.2 per cent, and no infection 9.2 per cent.

With animals immunized with human tubercle bacilli 42.1 per cent were completely successful, 42.1 per cent relatively successful, and 15.8 per cent failures. The controls gave complete infection in 12.5 per cent of the cases and partial infection in 87.5 per cent.

Immunization of bovines against tuberculosis, A. Weber, Fitze, and Iörn (*Tuberkulose Arb. K. Gsndhtsamt., 1910, No. 10, pp. 157–199; abs. in Molk. Ztg.* [*Hildesheim*], *24* (*1910*), *No. 35, p. 649*).—The results of tests extending over a period of 3 years with bovovaccination showed it to be without danger to the animal vaccinated, but the results obtained were not considered remarkable. In a barn freed from tuberculosis, according to Bang's method, tuberculosis spread as quickly among the vaccinated animals as amongst the unvaccinated ones. Tauruman vaccination, according to Koch and Schütz, apparently yielded good results in view of the fact that the calves from a herd which previously showed 95 per cent of tubercular animals with tuberculin was found on autopsy 2 or 3 years after vaccination to be free from tuberculosis. Attention is called to the possible danger of utilizing human tubercle bacilli for vaccination purposes.

The value of lymphatic tissue extracts in regard to the evolution of experimental tuberculosis, S. Livierato (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 54* (*1910*), *No. 4, pp. 332–337*).—This work with normal, scrofulous and tubercular lymphatic glands shows that animals treated with tubercular and scrofulous lymphatic gland extracts lived up to a period of 4 months after infection, while those treated with normal lymphatic gland extracts always died within 60 days, but lived 20 days longer than the control animals. The best results were thus obtained with tuberculous gland extracts. The lesions in the animals treated with normal lymphatic gland extract were pronouncedly tubercular, while those treated with the scrofulous and tuberculous gland extracts were only sparingly so.

Feeding mice with healthy meat, A. Schellhorn (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 54* (*1910*), *No. 5, pp. 428–450*).—The author fed mice with healthy germ-free meat, with the result that 50 per cent of the animals died in from 3 to 5 days. With mice fed on meat containing streptococci, 10 per cent succumbed only after 5 days, and 10 per cent of those fed on an 8-week old paratyphoid culture died after 26 days. One hundred per cent of the animals fed on the fresh paratyphoid bouillon culture died within 4 to 5 days.

The results thus show that not much reliance can be placed on the mouse feeding method for determining the fitness of meat for consumption.

In regard to swine plague and hog cholera, Martens (*Berlin. Tierärztl. Wchnschr., 26* (*1910*), *No. 24, pp. 477, 478*).—A description of cases and findings

on autopsy, with particular reference to finding hog cholera and swine plague in the same animal.

Vaccination against hog cholera, F. HUTYRA and J. WETZL (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 1, pp. 1–27; abs. in Rev. Gén. Méd. Vét., 15 (1910), No. 172, pp. 209–211*).—Following a review of the more recent investigations of hog cholera, the authors report upon immunization experiments conducted. Hyperimmune serum was found to confer an immunity which lasts for several weeks, and which through infection is transformed into an active immunity. Tests of the value of the serum-simultaneous method made on a number of animals are also reported. The incubation period of the disease was found to be from 15 to 18 days, but less when experimentally produced.

Etiology of sporadic and epidemic cerebro-spinal meningitis in the horse, A. CHRISTIANI (*Die Aetiologie der Sporadischen und Epidemischen Zerebrospinalmeningitis des Pferdes. Inaug. Diss., Univ. Bern, 1909, pp. 46, pl. 1, figs. 2*).—The author was able to determine microscopically and culturally that very little difference exists between the diplococcus isolated from cases of acute cerebrospinal meningitis of horses and the diplococcus intracellularis of Weichselbaum. Attention is called to the similarity of the pathological findings when compared with cases of human cerebrospinal meningitis. Living cultures of Borna's disease bacterium could not be obtained. The author was not able to say whether the diplococcus isolated from the horse was the only causative or dominant bacterium present for the primary and sporadic cases.

From the results of the agglutination tests with both the diplococcus intracellularis of Weichselbaum and the bacterium isolated from the acute cases of cerebrospinal meningitis of horses, it is concluded that the chemical composition of the bacterial body substances seems to be different. Statistical data are presented in which an effort is made to point out the different factors which have an influence on the occurrence of the disease.

Contributions to the study of chronic hypertrophic gastritis in the horse, ESCLAUZE (*Abs. in Berlin. Tierarztl. Wchnschr., 26 (1910), No. 23, pp. 467, 468*).—A description, with the clinical and autopsical findings, of an unusual case of chronic hypertrophic gastritis in a stud horse.

Immunization against African horse sickness, E. LEIPZIGER (*Beiträge zur Immunisierung gegen die Afrikanische Pferdesterbe. Inaug. Diss., Univ. Bern, 1909, pp. 69*).—The results show that horses are much more sensitive to the virus than mules, but that by long residence in the region where the disease is epidemic the animal obtains a certain degree of resistance against infection. The degree of resistance, however, is greater in mules. Immunity is conferred by recovering from an attack or by vaccination. The immunity may be latent from one rainy season to the other, but may be increased by injection of the virus and in this way preventing another attack on the immunized animals. The disease is carried from the mother to the fetus. Bearing mares when vaccinated near the end of pregnancy with medium amounts of the virus confer active immunity upon their offspring.

Owing to the great and individual sensitiveness of horses, the author recommends a simultaneous protective vaccination of 400 cc. of serum and 0.1 cc. of virus subcutaneously. Three weeks later a second immunizing injection is to be given, consisting of from 100 to 200 cc. of serum and 0.3 cc. of virus subcutaneously. Decreasing doses of virus should follow every other day down to 0.01 cc., and then increasing doses until a reaction is obtained. The prognosis in regard to the vaccination with imported horses is less favorable than with African horses.

Immunization against African horse sickness, E. LEIPZIGER (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), Nos. 1, pp. 52–80; 2, pp. 143–179; abs. in Rev. Gén. Méd. Vét., 15 (1910), No. 176, pp. 447, 448*).—An abstract of the above.

A new cat plague, A. GAERTNER (*Centbl. Bakt. [etc.], 1. Abt., Orig., 51 (1909), No. 3, pp. 232–249*).—In all of the cats which died during the epizootic the author was able to isolate and cultivate the same kind of ovid rod bacterium which belongs to the hemorrhagic septicemia group. When this rod bacterium was introduced into the organism of the cat by inhalation, by inoculation, intratracheally, or intrathoracicly pneumopleuritis was produced, and from this finding the author concludes that it is the cause of the cat plague.

A new cat plague, Z. SKRZYNSKI (*Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 5, p. 451*).—A polemical article in regard to the priority of the above.

[A new cat plague], A. GAERTNER (*Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 5, pp. 451, 452*).—A reply to the above, in which the differences in the bacteria isolated are pointed out.

Occurrence of acute anterior poliomyelitis in chickens, R. WILKE (*Deut. Tierärztl. Wchnschr., 17 (1909), No. 47, pp. 697, 698; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 46 (1910), No. 21, pp. 652, 653*).—In an 8-day-old chick motor paralysis occurred in both legs and wings but with sensory retention. In a second case (6 to 8 weeks old) the motor paralysis also occurred but improved gradually. Two other chickens 3 weeks old, from another source, showed the same symptoms. The author attributes the malady to successive inbreeding, which was the case with the above birds. The point of interest about these cases is the occurrence of a number of cases of acute anterior poliomyelitis amongst children in the same neighborhood.

Rôle of the leucocytes in normal and immunized animals artificially infected by the chicken cholera bacterium, A. SULIMA (*Ann. Inst. Pasteur, 23 (1909), No. 11, pp. 911–920*).—Weyl's method (with bacteria-free exudates) is deemed the best one to immunize guinea pigs and rabbits against fowl cholera. This indicates that micro-organisms and their products thus received in the animal body (which are the natural agressins) are better qualified as antigens than the bacteria cultivated on an artificial media. If stained sections are made of the subcutaneously inoculated areas of normal and immunized animals it can be seen that a barrier of leucocytes is thrown about the locality of the bacterial invasion. In the normal animal phagocytosis remains dormant, but in immunized animals a moderate degree of this is evident in from 6 to 8 hours and persists until the bacteria have all disappeared. On the other hand, normal animals show a multiplication of the bacteria in their organism.

The author assumes from this that owing to the sluggish manner in which the phagocytosis goes on other humoral protective agents must be active at the same time.

Contributions to our knowledge of leukemia, with particular reference to this malady in chickens, SKIBA (*Deut. Tierärztl. Wchnschr., 17 (1909), No. 28, pp. 405–412, figs. 3*).—A historical, clinical, and histopathological discussion of the subject, with the results of clinical findings with several chickens, some of which were affected with fowl diphtheria and fowl cholera. The author was not able to verify Ellermann and Bang's findings that the normal ratio of white to red corpuscles in the fowl is 1:100. With normal healthy hens it was 1:250 and with pigeons 1:300. Further, it is concluded that the leucocytosis observed by these authors must be attributed to another cause than the infective agent of leukemia.

RURAL ENGINEERING.

Poultry house construction and its influence on the domestic fowl, C. L. OPPERMAN (*Maryland Sta. Bul. 146, pp. 31, figs. 13*).—This bulletin reports the results of 2 years' study of types of poultry houses best adapted for Maryland conditions.

The main house used in these experiments was 90 ft. long by 15 ft. wide, 9 ft. high in front and 4 ft. 6 in. high in the rear. This building was divided into 6 pens 15 ft. square, known respectively as (1) the tight house, (2) the glass-front house, (3) the cloth-front house with hooded roost, (4) the open-front house with hooded roost, (5) the cloth-front house without hooded roost, and (6) the open-front house without hooded roost. The operation of the windows and curtains applies only to the months from November to March, inclusive, and to the early part of April. The brooder house used is also illustrated and described. The cost of the tight double-wall house was greater than that of any other type. The foundation stock used was pure-bred white Leghorn, 40 hens constituting a pen.

The results of experiments thus far show that the fowls kept in the less expensive houses gave as high returns as, and in several instances higher than, those confined in more costly buildings. The general health of the fowls in the different pens was practically the same during the first 2 years. The only apparent difference was the absence of bright red combs in the first 2 pens, due presumably to the lack of fresh air. The excessive moisture in the tight house caused the plumage of the fowls to appear rough and dirty. It was also noticed that the plumage of the fowls which were allowed free access to the yards at all times was brighter and did not have the scraggy appearance of the fowls which were confined. There was very little difference in the amount of food consumed by the fowls in the 6 experimental pens. The influence of construction was not noticeable during the pullet year of the first generation on the vitality of the developing embryo. During the second year there was an increase in the number of total eggs hatched in all pens except in the first and third. The eggs from the fowls in pens 5 and 6 produced 20 per cent more chicks than did the fowls in the first pen. The results of hatches 1 and 2 would indicate that the influence of environmental conditions on the progeny was not positive enough to be of significance, but for hatch 3 there was a noticeable variation in favor of pen 6.

An unknown disease, believed to be due to soil contamination, affected the chicks the second year and influenced the results to some extent. In that year the progeny of pen 6 were more resistant to disease than those of any other pen. "The offspring from the tight house were fully as resistant as those of any pen except No. 6. This would indicate that the parent stock was still vigorous in spite of their abnormal housing conditions. All results point to the fact that the most desirable conditions for maintaining the vigor and productive power of the breeding stock are those found in the open-front house with exposed roost."

"The present data indicate that egg production is largely influenced by the action of individual hens, rather than by environmental conditions. This, of course, applies to the first generation. It may be found that future generations will show a more definite variation in favor of the fresh-air houses, or vice versa."

A dry-mash hopper for laying hens is illustrated and described.

Practical poultry buildings, H. L. BLANCHARD (*Washington Sta. Bul. 4, spec. ser., pp. 3–29, figs. 17*).—This bulletin gives illustrations, plans, specifica-

tions, and complete lists of materials required for the construction of poultry buildings, such as are now in use at the Puyallup Substation. Advice is also offered concerning the selection of the site for the buildings.

The incubator house described is 16 by 20 ft., with 9-ft. posts, and is large enough to hold 6 250-egg incubators. In this house "three hatches of hen eggs were made, which, with the exception of one machine on one occasion, hatched an average of from 85 to 93 per cent of the fertile eggs, producing chicks of exceptional vigor and constitution, which since September and October have been demonstrating their superiority as layers. In one of these machines were set 102 turkey eggs, from which were hatched 86 turkeys, strong and vigorous."

The brooder house is 16 by 50 ft., and contains 12 windows and faces south in order to let in as much sunlight as possible. The yard is located on the south side of the buildings. The colony coops are 6 by 3 ft., and will hold about 50 chickens from 6 to 8 weeks of age. The laying house of 140 by 12 ft. contains 8 rooms 12 by 15 ft. and a feed room.

Poultry houses, D. J. LANE and N. C. CHAPMAN (*Univ. Minn., Dept. Agr., Ext. Bul. 8, pp. 16, figs. 13*).—Several types of poultry houses are illustrated and described.

Report on service condition of paints, J. DEWAR (*North Dakota Sta. Paint Bul. 4, pp. 2–56*).—A report on the service condition of paints on buildings and test fences in the vicinity of the station, made by a representative of the International Association of Master Painters and Decorators of the United States and Canada. See also previous work (E. S. R., 20, p. 1089; 22, p. 793).

Practical results of underdrainage, W. H. DAY (*Ann. Rpt. Sec. Agr. Nova Scotia, 1909, pt. 2, pp. 18–32, figs. 5*).—The data presented have already been noted from another source (E. S. R., 22, p. 589).

RURAL ECONOMICS.

New views on agricultural economics, G. BORGHESANI (*Agr. Mod., 16 (1910), No. 13, pp. 170–172*).—The author discusses the factors which enter into the cost of production and the price of agricultural products, and calls attention to some of the latest teachings of agricultural chemistry, soil bacteriology, biology, and soil analysis in their bearing on the cost of production and the net returns to the producer.

If the teachings of these sciences be regarded as correct, there has been a great waste of economic forces in agricultural wealth production in the past, such as the use of more fertilizers than plants could assimilate and the application of more capital and labor than would yield profitable returns. The teachings of these sciences, it is believed, determine to a greater or less extent the quantity of fertilizer, the degree of intensity of culture, and the amount of capital and labor that can be employed to give the greatest net returns to producers of agricultural forms of wealth.

The farmer and his relation to the economics of the nation, E. J. WATSON (*1910, pp. 23*).—The great value of farm products as the basis of economic activity in providing food and clothing for mankind is pointed out in this address delivered before the National Farmers' Convention, St. Louis, May 2–7, 1910. The economic difficulties under which Southern cotton growers dispose of their crops in the United States and foreign countries are emphasized.

Documentary history of American industrial society.—Plantation and frontier, 1649–1863, U. B. PHILLIPS (*Cleveland, Ohio, 1910, vols. 1, pp. 375; 2, pp. 379*).—A history of farm, plantation, and frontier life in the United States from 1649 to 1863, with particular reference to its economic, social, and industrial phases.

Agricultural organization in Illinois, 1870–1880, S. J. BUCK (*Reprint from Jour. Ill. State Hist. Soc., 1910, Apr., pp. 16*).—An account of the rise and decline of the Patrons of Husbandry and the State Farmers' Association in Illinois from 1870 to 1880.

The progress of agriculture in France during the past half century, G. MARTIN (*Égypte Contemporaine, 1910, Nos. 1, pp. 55–85; 3, pp. 411–423*).—This is a detailed contribution to comparative rural economy with particular reference to the development of the various forms of mutual aid and agricultural cooperation in France during the past 50 years.

The English agrarian problem in the light of the last election, F. VON MACKAY (*Ztschr. Agrarpolitik, 8 (1910), No. 6, pp. 235–239*).—This article discusses the Land Improvement Acts of 1883, 1895, 1906, and 1908, the Small Holdings and Allotments Act of 1907, and the Development Fund Act of 1909, and the bearing these laws have on solving the agrarian problem in England. The late election in England is regarded as indicating the popular interpretation of recent legislation with reference to the change in land tenure, the encouragement of small holders, and the repopulation of rural districts.

The small holdings controversy: Tenancy vs. Ownership, Mrs. ROLAND WILKINS (*London, 1910, pp. 23*).—This pamphlet presents arguments for the success of small holdings in England on the basis of tenancy rather than of ownership.

Agricultural conditions in southern New York, M. C. BURRITT (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 64, pp. 19, figs. 6*).—This circular describes the extent and conditions of the nonproductive agricultural lands of southern New York, these embracing the whole or portions of 19 counties, and makes suggestions for their utilization and improvement by means of rational cropping and stock raising systems of farm management. The lines of development indicated for the average type of so-called abandoned farms of this region are the live-stock industries, the growing of fruit, and the conservation of the farm wood lot, each of which is briefly discussed. The following is a summary of the author's conclusions:

The run-down condition of land in southern New York is due primarily to the misuse and not to the natural infertility of the soil. The following means are to be depended upon to build up this land: (1) Thorough tillage and liming are the first steps in securing a clover crop, which forms the basis of practically all the successful systems of farming employed in this region; (2) the addition of humus to the soil is the next important step, buckwheat and winter rye being the two most promising crops for this purpose, one of which can be grown and plowed under inside of twelve months; (3) when a stand of clover is once obtained a short rotation should be adopted, including clover, some grain crop for feeding work stock, and a cash crop; and (4) a potato crop is often the first necessity, in order to provide ready money for improvements and farm operations. After the soil has been improved any one of several systems of farming, such as dairying, sheep raising, fruit growing, etc., whichever is suited to the given locality, can be built up on this foundation.

Farmers at work, C. C. GEORGESON (*Alaska Stas. Rpt. 1909, pp. 28–32, pls. 2*).—Brief accounts are given of methods and results of farming, gardening, and live stock raising in the vicinity of Fairbanks, Alaska.

Renting plan that is bettering 280 acres, A. J. BILL (*Farmers Voice, 49 (1910), Nos. 97, pp. 3, 4, figs. 3; 98, pp. 4, 15, figs. 3*).—This article gives an account of arrangements made between landlord and tenant on a five-year lease of a 280-acre farm situated in McLean County, Ill., which has for its aim better

financial returns to both parties and the improvement of the land. The financial returns for 1909 were as follows:

Returns of a 280-acre farm in 1909 under tenant occupancy.

Crop.	Gross returns.	Tenant's share.	Owner's share.
Corn	$3,765.67	$2,259.39	$1,506.28
Oats	690.00	345.00	345.00
Hay	516.03	258.01	258.02
Hogs	1,113.37	829.83	283.54
Total	6,085.07	3,692.23	2,392 84

From the tenant's share must be deducted the sum of $750 paid for hired labor, giving a net income to the tenant for the year of $2,942.23.

The gross farm returns show an average return of $21.73 per acre for the entire farm, including several acres of land about the house and barns and along the roadsides that grew no crop and every foot and corner that failed wholly or in part for any reason. The farm is devoted to live stock, cereals, and hay production, and the system of farm management under tenant occupancy and its benefits in increasing crop yields and maintaining soil fertility are described in detail.

The agricultural labor problem, Vogt (*Württemb. Wchnbl. Landw., 1910, No. 24, pp. 393–396*).—The author traces the development of the agricultural labor problem in Germany since 1857, and shows that, notwithstanding the increase of wages in all branches of field labor and farm domestic service which makes the pay of farm hands better than that of industrial workers and of other means employed to increase the number of laborers, there is great difficulty in securing competent farm help at the present time.

The author believes that one of the best means of encouraging the young to remain on the land is to train them in self-reliance and to take an interest in their work. His own experience along these lines and its results are presented.

Plan of obligatory mutual insurance against losses of live stock in Egypt, J. B. Piot Bey (*Égypte Contemporaine, 1910, No. 3, pp. 369–375*).—On account of serious losses of live stock as a result of poisoning and contagious diseases, mutual compulsory insurance against loss is urged by the author, to be organized and directed by the government throughout Egypt. Such insurance it is believed would add greatly to the moral and material progress of the Egyptian small holder and to the economic welfare of the country as a whole. The text of a proposed law for the organization, operation, and supervision of such insurance societies is included.

The principal English markets, P. Lefebvre (*Min. Int. et Agr.* [*Brussels*], *Off. Rural, Avis aux Cult., 2. ser., 1910, No. 4, pp. 75, pls. 8*).—This is a description of the organization and selling methods of the London, Liverpool, Manchester, and Hull markets, with a list of the chief kinds of agricultural products sold thereon. The bulletin is issued for the purpose of indicating to Belgian farmers the trade openings which England offers for the products of their farms.

Inventory of the statistics of agricultural products and farm animals, C. C. Clark (*Internat. Inst. Agr.* [*Italy*], *Bul. Agr. Statis., 1 (1910), No. 5, pp. 35–41*).—Estimates of areas sown and condition of winter and spring cereal crops of 1909–10 in the chief cereal-producing countries of the world are reported.

The cost of producing Minnesota farm products, 1902–1907, E. C. PARKER and T. P. COOPER (*Minnesota Sta. Bul. 117, pp. 69, pls. 2, fig. 1*).—Previously noted from another source (E. S. R., 21, p. 188).

AGRICULTURAL EDUCATION.

The problem of vocational education, D. SNEDDEN (*Boston, New York, Chicago, 1910, pp. VII+86*).—The author discusses the general relations of practical training to liberal education, the main types of vocational instruction, the pedagogical considerations involved, and the conditions of successful industrial teaching in the public schools. A special chapter is given to the problems of agricultural education.

Approved course in agriculture for high schools and academies in Maine, W. D. HURD (*Waterville, Me., 1909, pp. 66*).—This course is designed to be used in schools where a teacher trained in agriculture is employed to give the instruction. The outlines, exercises, and bibliographies on soils, plant life, fertilizers, farm animals, dairying, poultry, fruit growing, vegetable gardening, economic insects, farm mechanics, and farm management are therefore designed primarily for the use of the teacher rather than the pupil, but with the expectation that only such matter will be selected for class use as is adapted to local conditions and interests.

Elementary horticulture for California schools, C. F. PALMER (*Los Angeles Normal School Bul. [1910], pp. 76, figs. 13*).—The principal topics treated by the author are the school garden, lath-house (for shading certain plants), seed-sowing in boxes, transplanting, plant propagation, potting and repotting, house plants, window boxes, planting and care of bulbs, lawn-making, and ornamental gardening. A section is devoted to information as to where seeds can be obtained of plants adapted to California conditions, and references are made to available publications of this Department.

Farmers' institutes and university extension in agriculture, W. T. CLARKE (*California Sta. Circ. 55, pp. 4*).—An outline is given of the various activities of the division of university extension in agriculture, with statistics of the work done in 1909–10.

MISCELLANEOUS.

Annual Report of Alaska Agricultural Experiment Stations, 1909 (*Alaska Stas. Rpt. 1909, pp. 82, pls. 10*).—This contains a report of the chief lines of work carried on during the fiscal year ended June 30, 1909, including an account of the closing of the Copper Center Station. Meteorological data, and accounts of the extensive tests with field and garden crops and of the live stock operations, are abstracted elsewhere in this issue.

Twentieth Annual Report of Arizona Station, 1909 (*Arizona Sta. Rpt. 1909, pp. 557–597, pl. 1*).—This contains the organization list, an administrative report by the director on the work and publications of the station, a financial statement for the fiscal year ended June 30, 1909, departmental reports, the experimental features of which are abstracted elsewhere in this issue, notes on trees for growing at higher altitudes, analyses of 2 samples of milk, suggestions regarding individual pumping plants, and records of frost temperature at 3 points near Tucson, Ariz.

Monthly Bulletin of the Department Library, June and July, 1910 (*U. S. Dept. Agr., Library Mo. Bul., 1 (1910), Nos. 6, pp. 141–167; 7, pp. 171–198*).—These numbers contain data for June and July, 1910, respectively, as to the accessions to the Library of this Department and the additions to the list of periodicals currently received.

NOTES.

Colorado College.—Henry E. Dvorachek, University of Minnesota, 1910, has been appointed instructor in animal husbandry, and B. G. D. Bishop, secretary of the State Dairymen's Association, has been appointed professor of dairying.

Connecticut State Station.—The station has made an exhibition illustrative of its work at five of the agricultural fairs in the State, using for the purpose a 40 by 60 foot tent. Members of the staff were in attendance to explain the exhibit to those desiring to examine it carefully. The exhibit was visited by several thousand people, several counts showing between four and five hundred persons in the course of an hour. Many of these were only curiosity hunters, but there were a considerable number who were anxious to see the exhibit, to learn what the station is doing, and to discuss practical matters with those in attendance. Although the enterprise required time equivalent to five weeks of institute work on the part of the station staff and caused interruption of the regular work, the numerous expressions of approval led to the belief that the exhibition was very effective and ought to be made a yearly feature of the work.

Georgia College.—Hon. George Gilmore, of Warthen, has been appointed to the board of trustees to succeed L. H. O. Martin. T. A. Early, who has been in charge of school-extension work in cooperation with this Department, has been transferred to Tennessee and has been succeeded by J. Philander Campbell.

Indiana Station.—Recent appointments include David O. Thompson, formerly principal of the Winnebago County School of Agriculture and Domestic Economy (Wis.), as extension worker in animal husbandry; F. G. King, of the Kansas College, associate in animal husbandry, vice H. P. Rusk, whose resignation has been previously noted; and Clayton R. Orton, of the Bureau of Plant Industry of this Department, as assistant botanist.

Iowa College.—A breakfast-bacon special train was recently sent out, one car being devoted to home economics work, especially the cooking of pork and the formation of branch home economics associations. Another special car was assigned to children.

Henry Ness, assistant in zoology, has resigned to accept a position with the agricultural school at Jonesboro, Ark.

Kansas College.—The rural education department is sending out circular letters and circulars to encourage the organization of companies of Rural Life Boy Scouts. The plan is to form local companies wherever six or more boys between the ages of 12 and 20 years desire to become members. These companies are to be in close touch with the agricultural college council, and there are also to be county councils and a chairman, to be appointed by the agricultural college. Monthly meetings are to be provided for, with a regular order of business, and rural life camps of instruction for each company. The program of the instruction camps will include games and athletic contests, contests in judging farm crops and stock, naming birds, wild animals, fish, flowers, trees, shrubs, etc., talks on rural-life subjects, and other features.

The scouts are divided into three classes, according to their knowledge of birds, wild animals, fish, flowers, trees, and other natural objects, the amount

of work they do in the way of cultivating crops and caring for live stock, and the amount of money they have on deposit in their own bank accounts. Thus, scouts of the first class are supposed to know by sight and call 50 common birds of Kansas, by sight and track all wild animals of Kansas, by sight all the common game fish of Kansas, 25 wild flowers, all common trees and shrubs of Kansas, and 25 common weeds; they are to plant and cultivate not less than 2 acres of farm crops, to own and care for some pure-bred domestic animal valued at not less than $25, to maintain a bank account of not less than $25, and to read at least two books on rural life.

Francis B. Milliken has been appointed assistant entomologist in the station, vice Harry Evans, whose resignation has been previously noted.

Kentucky University.—*Breeder's Gazette* announces that arrangements have been completed for the cooperative use by the college of a large estate within 5 miles of Lexington as a source of illustrative material for study and investigations. In return for this use by students and instructors, the owners of the estate will receive expert advice and the benefits of the increased returns. It is expected that in this way it will be possible to study dairy and live-stock methods under practical conditions, and to test results of plant-breeding studies and similar work.

Maine University.—The entering class in the college of agriculture numbers over 80, constituting 40 per cent of the total enrollment of freshmen in the university. The extension department is now offering eleven correspondence courses.

Massachusetts College.—The extension department has begun the publication of a monthly leaflet, entitled *Facts for Farmers*. The September issue, which is the first in the series, contains directions for selecting corn for exhibition and includes score cards for flint and dent corn, with explanations. The department has also been making extensive exhibits of the college and station work at various fairs in the State, and in some cases has been supplementing these with lectures and demonstrations.

Minnesota University and Station.—The attendance at the college of agriculture has increased over last year from 285 to 405. The chief gain has been in the home economics course. A two-year teachers' course in home economics, which is being given for the first time, is also proving popular.

Recent promotions to the grade of assistant professor include W. H. Handschin in animal husbandry, A. G. Ruggles in entomology, G. P. Grout in dairy husbandry, and LeRoy Cady in horticulture. W. H. Tomhave has returned from work in Manchuria, and is now connected with the live-stock section of the extension department. C. E. Snyder, assistant editor of the *National Stockman and Farmer*, has been appointed instructor in animal husbandry and assistant animal husbandman in the station.

Montana Station.—R. F. Miller has been appointed assistant in animal industry in connection with the wool investigations.

New Hampshire College and Station.—O. L. Eckman has been appointed assistant professor of animal husbandry and assistant animal husbandman, vice J. C. McNutt, whose resignation has been previously noted.

Cornell University.—Wilford M. Wilson, director of the Weather Bureau office in Ithaca, has been appointed honorary professor of meteorology in the college of agriculture.

New York State Station.—Leaves of absence for advanced study have been granted M. J. Prucha, associate bacteriologist; James T. Cusick, assistant chemist; and Richard Wellington, assistant horticulturist. Anton R. Rose, assistant chemist, and Maxwell J. Dorsey, assistant horticulturist, have resigned to accept

positions in Columbia University and Cornell University, respectively, with opportunities for postgraduate study and research.

Ohio University and Station.—Agricultural extension schools, continuing one week each, will be held in 80 out of the 88 counties during the present year. J. H. Gourley, assistant horticulturist at the station, has been appointed assistant professor of horticulture and Harry E. Evans assistant professor of animal husbandry. Both will devote their time to agricultural extension work.

Oklahoma College and Station.—The enrollment in the college of agriculture is now 735. A live stock and dairy demonstration train was recently sent out over the Sante Fe and Frisco lines, carrying 1 car of live stock, 1 car of machinery, 1 car of general exhibits, and 1 flat car for demonstration and exhibition purposes. A 5-car wheat-improvement special train has also been operated over the Rock Island system.

A school of agriculture for boys, held at the state fair during the week of October 3, was attended by 150 boys. In view of the success of the work the state board of agriculture has authorized the college officials to plan for holding 6 of these schools in different parts of the State during the coming year, to which both boys and girls are to be admitted.

A. C. Hartenbower has been appointed assistant professor of agronomy in the college and assistant agronomist in the station.

Oregon College and Station.—Recent appointments include George F. Sykes, an assistant in the biological laboratory of the Brooklyn Institute of Arts and Sciences at Cold Spring Harbor, Long Island, as instructor in zoology; William E. Lawrence, of the Oklahoma College, as instructor in botany; V. I. Saffro, of the Bureau of Entomology of this Department, as assistant in entomology; and C. C. Lamb, as foreman of the station poultry plant.

South Carolina Station.—J. E. Toomer, of the Alabama Station, has been appointed assistant chemist, and has entered upon his duties.

Tennessee Station.—F. H. Denniss, dairyman, is no longer connected with the station.

Wisconsin University and Station.—The entering class in the four-year and two-year courses of the college of agriculture shows an increase of about 60 per cent, and in the department of home economics the total increase is about 100 per cent. Six foreign countries are represented in the enrollment in the college of agriculture.

The $30,000 dairy laboratory has been completed and is being used for the winter dairy course, which opened November 2. A new sheep barn, silo, and manure storage shed have also been erected, a potting house and four greenhouses are nearing completion, and ground has been broken for the foundations of a horticultural building. An allotment of $60,000 is available for the new horticultural equipment.

Orman R. Butler, Ph. D. (Cornell, 1910), has been appointed instructor in horticulture and assistant horticulturist. Doctor Butler has specialized in plant physiology and will devote his entire time to research work. Roy T. Harris has been appointed assistant in dairy tests, vice Llewelyn R. Davies, who has accepted the professorship of agriculture in the Marinette County (Wis.) School of Agriculture and Domestic Science. E. R. Jones has been granted leave of absence during the second semester to study soil physics and drainage in this country and abroad. The degree of doctor of science was recently conferred by the university on Dr. F. H. King, formerly professor of agricultural physics.

Wyoming Station.—A grain barn has been completed and fitted up where seed grains will be kept and displays of grains in various years will be made.

Association of Agricultural Experiment Stations in Austria.—A preliminary meeting of representatives of the agricultural experiment stations in Austria, called by Dr. F. W. Dafert with the consent of the Royal Imperial Ministry of Agriculture, was held at the Royal Imperial Agricultural-Chemical Experiment Station, Vienna, September 12. It was resolved to organize an Association of Agricultural Experiment Stations in Austria, and a committee on organization was appointed, consisting of Dr. F. W. Dafert, F. Strohmer, Doctor Kornauth, Doctor Bersch, Director Prior, and Ritter von Weinzierl, of Vienna, and Director J. Vanha, of Brünn. The *Zeitschrift für das landwirtschaftliche Versuchswesen in Oesterreich* was designated as the official publication of the association.

Farmer's National Congress.—The thirtieth annual session of this organization was held at Lincoln, Nebr., October 6–11. The extended program included addresses of welcome by Governor Shallenberger and by Chancellor Avery, of the University of Nebraska.

Among the papers of special interest were Manufacture and Use of Mechanical Alcohol, by Dr. H. W. Wiley, of this Department; Domestic Science, by Miss Gertrude Rowan, of the University of Nebraska; Deterioration of Soils Under Cropping and Method of Conservation, by Dean E. A. Burnett, of the University of Nebraska; The Relation of Conservation to Rural Life, by Prof. George E. Condra, president of the State Conservation Commissioners of the United States; Dairying in the United States, by A. L. Haecker, of the University of Nebraska; Extension Work and Cooperation of Agricultural Colleges, by Dean Woods, of the University of Minnesota; and Conservation of Health by Dairy Inspection and Pure Food Regulations, by Dr. George M. Whitaker, of the Dairy Division of this Department.

President Edwin E. Sparks, of the Pennsylvania State College, in an address entitled Carrying the Message to the People, argued for the teaching of agriculture in the public schools and for making the public schools in the country very intensively agricultural. Prof. C. W. Boucher, of Marion Normal College, Indiana, speaking on the Education of the Farmers' Boys and Girls, brought out the desirability of a broader education for the farmers' sons and daughters with a view to widening their horizon and giving them a more comprehensive view of life and its responsibilites.

The officers of the previous year were reelected.

Fifth Dry Farming Congress.—Over 1,200 delegates, representing 250,000,000 acres of arid lands in this country, 400,000,000 acres in Canada, and a total of about 5,000,000,000 acres throughout the world, assembled for the Fifth Dry Farming Congress at Spokane, Wash., October 3–6.

A large number of addresses and papers were presented, the consensus of opinion being that dry farming was passing from the experimental stage and becoming an important phase of agricultural development. President J. H. Worst, of the North Dakota College and Station, was chosen president of the congress, and Prof. Alfred Atkinson, of the Montana College and Station, Dean E. H. Webster, of the Kansas College and Station, and State Commissioner of Agriculture E. R. Kone, of Texas, vice-presidents. John T. Burns was reelected executive secretary-treasurer, with headquarters at Colorado Springs, Colo., which was selected as the place of meeting in 1911.

Fifth International Dairy Congress.—This organization will next meet at Stockholm from June 28 to July 1, 1911. It will be organized in two sections, one devoting itself to questions regarding the production of the milk and the other to those concerning the treatment and utilization of milk. Numerous excursions to near-by dairy farms and other points of interest will form a feature of the conference.

International Scientific Congress at Buenos Aires.—The International Scientific Congress, held at Buenos Aires, from July 11 to 25, under the auspices and direct management of the Argentine Scientific Society, was well attended and considered very successful.

Agricultural science received much attention, constituting one of the 11 sections of the congress. A large number of papers were presented in this section, among them one by Juan A. Devoto on his investigations of the micro-organisms of milk, one by Doctor Wolffhügel on the zooparasites of the domestic animals of Argentina, and one on the degeneration of the malbek, by Señor Suarez. Two sessions were also devoted in the engineering section to irrigation questions, especially the laws and systems in Argentina and their betterment.

Resolutions were adopted advocating the formation of agrarian societies patterned after those in France, the greater use of agricultural machinery and additional instruction in the subject, the development of the sugar-beet and cotton-growing industries, and the adoption of uniform regulations in all American countries as to the importation and exportation of animals.

Poultry Demonstration Train in Wales.—A poultry demonstration train, fitted up with improved poultry appliances and other illustrative material, was recently sent out for eight days in Wales. Lectures and demonstrations were given along the route, the advantages of cooperation in marketing receiving particular emphasis. The train is believed to have been the first of the sort in Great Britain, but it is reported that it was very favorably received and that the plan will be given an extended trial in other sections.

National Agricultural Boards in Mexico.—A recent law provides for the establishment of national agricultural boards, the object of which is to develop agriculture, and especially stock raising, forestry, and related industries. They will encourage the holding of agricultural expositions and will keep in touch with domestic and foreign boards of the same class. One feature of their work will be the publication of reports for the information and instruction of agriculturists, the awarding of prizes for treatises on agriculture, the establishment of agricultural schools, and the creating of scholarships to aid in the study of agriculture.

National College of Agriculture at Pretoria.—According to a note in *Nature*, the Transvaal Government is considering the establishment of a national college of agriculture at Pretoria, with an initial endowment of $500,000. An area comprising 3,681 acres, and including a large plantation and both arable and pasture land, has been offered by the town council as a site.

Agricultural Instruction in the University of Toulouse.—An agricultural institute has been annexed to the faculty of sciences of the University of Toulouse. The course of study extends through two years, leads to the diploma of agriculture, and includes theoretical and practical instruction in the following subjects: General agriculture, agricultural botany, agricultural chemistry, agricultural engineering, rural economy, geology, agricultural zoology, and animal breeding. In addition there is a series of weekly lectures on horticulture, silviculture, viticulture and œnology, rural architecture, agricultural hydraulics, agricultural hygiene, meteorology, apiculture, etc.

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EXPERIMENT STATION RECORD.

Vol. XXIII. ABSTRACT NUMBER. No. 8.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

On the composition of lime-sulphur spray, H. V. TARTAR and C. E. BRADLEY (*Jour. Indus. and Engin. Chem., 2 (1910), No. 6, pp. 271–277*).—From the results of the work the authors conclude that "simple and accurate methods for the determination of the composition of the polysulphids and the amount of calcium hydroxid have been perfected. Free dissolved calcium hydroxid is not a constituent of the lime-sulphur solution, its alkalinity being due to the hydrolysis of the polysulphid. The polysulphids in the solution are probably a mixture of the tetrasulphid and pentasulphid of calcium. [The] tests show the absence of appreciable quantities of hydrosulphid. Should any be present, it is that which might be formed by the hydrolysis of the polysulphid. There seems to be a more stable polysulphid of calcium which the results indicate to be CaS_5. A considerable amount of the sulphur in the solution is very feebly combined and for practical spraying purposes may be considered as sulphur in physical solution. It is not necessary for the spray to oxidize in order that free sulphur may be deposited from the same. Prolonged boiling when approximately one part of lime to two parts of sulphur are used causes an increase in the amount of polysulphids and a decrease of thiosulphate. Carbon dioxid reacts with the lime-sulphur solution, liberating hydrogen sulphid. [The] laboratory experiments indicate that the carbon dioxid of the air exercises some influence in the decomposition of the spray upon the tree."

Further studies of the reactions of lime-sulphur solution and alkali waters on lead arsenates, C. E. BRADLEY and H. V. TARTAR (*Jour. Indus. and Engin. Chem., 2 (1910), No. 7, pp. 328, 329*).—"It appears from . . . the results that both forms of the lead arsenate are more soluble in saline waters than in pure waters. Alkaline carbonate waters especially exert a solvent action on these arsenates and the reaction is much more pronounced in the case of the acid arsenate. This is perhaps due to the fact that lead carbonate is extremely insoluble and that a base with which arsenic forms a soluble salt is present. It is evident that waters containing considerable quantities of alkali carbonates should be avoided in mixing lead arsenate for spraying purposes, as their tendency is to render the arsenic soluble. Tests for lead in the alkaline solutions failed to show its presence therein."

The phosphates of calcium, F. K. CAMERON and J. M. BELL (*Jour. Amer. Chem. Soc., 32 (1910), No. 7, pp. 869–873*).—The increasing importance of the phosphates of calcium in the fertilizer industry led the authors to study their

behavior in water and in solutions. They conclude that "the presence of potassium chlorid in solutions containing calcium oxid and phosphoric anhydrid increases slightly the lime content of solutions in equilibrium with dicalcium phosphate and monocalcium phosphate.

"By the 'tell-tale' method the composition of the solid phases was found to be $CaHPO_4.2H_2O$ and $CaH_4(PO_4)_2.H_2O$ with a region between, which was not explored, where the composition of the solid was probably $CaHPO_4$.

"This result is in accord with Bassett's last determination of the transition interval of $CaHPO_4.2H_2O \rightleftarrows CaHPO_4+2H_2O$, but is not in accord with his direct determination of the compositions of the solid phases."

The proportion of organic phosphorus to amids and other nonproteid bodies in seeds, A. PARROZZANI (*Staz. Sper. Agr. Ital., 42 (1909), No. 10–11, pp. 890–901; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 2–3, p. 78*).—The amount of amid nitrogen and the other nonproteid nitrogenous substances present is proportional to the amount of organic phosphorus in the seed. The work was done with maize seeds which were fully matured and from plants which were variously fertilized.

Comparative investigation in regard to the composition of the casein of cow's and woman's milk, E. ABDERHALDEN and L. LANGSTEIN (*Ztschr. Physiol. Chem., 66 (1910), No. 1–2, pp. 8–12*).—With reference to whether the casein from woman's milk yields on hydrolysis the same amount and ratio of amino acids as the casein of cow's milk, the authors found identical results in regard to tyrosin and glutaminic acid and that no glycocol could be found in either of the caseins. The remaining amino acids also agreed fairly well for both caseins. The findings, however, are not considered conclusive as regards the identity of the caseins.

Protein as a protective agent of the enzyms, L. ROSENTHALER (*Biochem. Ztschr., 26 (1910), No. 1–2, pp. 9–13*).—The results with δ- and σ- emulsin, diastase, and invertin show that protein exerts a protective action for these enzyms against alkali and acids. The author, therefore, calls attention to the analogy which may exist in the biochemical processes in the animal and vegetable world.

Further studies of the partial hydrolysis of proteids, E. ABDERHALDEN and C. FUNK (*Ztschr. Physiol. Chem., 64 (1910), No. 5–6, pp. 436–446*).—The experimental data reported and discussed have to do with the problem of determining the structural formula of proteids with particular reference to the utilization of the β-naphthalinsulpho derivatives of the polypeptids for this purpose.

About lupeose and stachyose, E. SCHULZE (*Ber. Deut. Chem. Gesell., 43 (1910), No. 12, pp. 2230–2234*).—The author shows that lupeose prepared from the seed of lupines after treatment with nitric acid yielded saccharic acid in addition to the other oxidation products. He was also able to produce a potassium salt which had the characteristics of potassium saccharate. According to this, lupeose yields the same products as stachyose (E. S. R., 23, p. 110), and as it yields about the same amount of mucic acid as does stachyose, it is probably also a tetrasaccharid. Lupeose could not be brought to crystallize.

Some peculiarities of the proteolytic activity of papain, L. B. MENDEL and ALICE F. BLOOD (*Jour. Biol. Chem., 8 (1910), No. 3, pp. 177–213*).—The experiments led to the following conclusions:

"The digestion of Witte's peptone by papain in the presence of the common antiseptics, judged by the tryptophan test, is very slow; in the presence of HCN, hydrolysis is rapid. The striking difference between HCN and other investigated antiseptics is due to an acceleration of proteolysis by HCN. The accelerating effect is not limited to the hydrolysis of 'peptone,' but is also

shown in the digestion of raw and coagulated egg white, fibrin, edestin, and excelsin, whether one take as the gage of digestion the appearance of tryptophan, leucin and tyrosin, the conversion into products not precipitated by hot trichloracetic acid or the rate of solution of insoluble protein. HCN also accelerates the clotting of milk and the liquefaction of gelatin. The bearing of this on the evidence for the existence of more than one proteolytic enzym in papain is discussed.

"Of various substances tried, hydrogen sulphid was the only one which produced an acceleration of digestion by papain comparable to that effected by HCN.

"The activity of HCN can not be attributed (a) to a peculiarly favorable concentration of hydrogen ions; (b) to the destruction of an inhibiting substance in the papain; (c) to the destruction of an inhibiting substance in the substratum; (d) to a permanent denaturation of the substratum; or (e) to the activation of a papain zymogen. Pending further investigation, nothing remains but to compare the behavior of HCN with that of the so-called co-enzyms.

"The rapid digestion of egg-white which papain effects when mixtures of the enzym and protein are heated to boiling has been confirmed; and it has been shown that typical plant proteins—excelsin and edestin—are digested with similar rapidity at 80°. Under the especially favorable conditions established by the presence of HCN, digestion at 80° proceeds to the amino-acid stage.

"In regard to the marked deterioration which papain is said to undergo when it stands with uncoagulated egg-white, it appears that this can not be considered a constant characteristic of the enzym in question, inasmuch as it was found that in the 6 samples of papain which were studied the spontaneous deterioration of the enzym on standing in solution in every case more than accounted for the loss of activity when it stood with the protein. Egg white, if anything, protects papain from deterioration.

"The fresh latex of the pawpaw resembles the dried material in its behavior toward antiseptics and temperature, and in the phenomena of deterioration.

"Extracts of Ascaris which are strongly antiseptic and antitryptic exert no inhibition over papain proteolysis. The behavior of papain toward Ascaris antienzyms, the acceleration phenomena induced by HCN, and the peculiar temperature relations, place papain in a different category from pepsin, trypsin, and animal erepsin. Data already recorded or available from other plants in respect to the HCN acceleration and other features place papain in contrast with other vegetable enzyms. The facts reported do not exclude the possibility of the simultaneous presence of more than one enzym in the pawpaw latex."

The study of enzyms by means of the synthetical polypeptids, A. H. Koelker (*Jour. Biol. Chem.*, *8* (*1910*), *No. 2*, *pp. 145–175*).—"For the study of the proteolytic enzyms, racemic alanyl-glycin can be applied with great accuracy, using the optical method. Solutions of d-alanyl-d-alanin and of racemic alanyl-glycin remain unchanged when they are allowed to stand at 15 to 20° for a period of 13 months, if toluol has been used as preservative. This proves that within the time mentioned neither water nor bacteria have any influence in hydrolyzing the dipeptids. Buchner's grinding and pressing method yields the most active enzym. The precipitation with alcohol can not be used to advantage in the purification of the active principle. The active principle which hydrolyses alanyl-glycin has the property of dialyzing through parchment. The solution of the enzym which has been freed from most of the solids by dialysis can be evaporated to dryness and redissolved without being impaired in its activity. The ferment is still present after 13 days' digestion at 37°. Heating the solution of the enzym to a temperature of 75° for 6 minutes destroys the active principle completely. Sodium chlorid has no influence upon the rate of hydrolysis. It has, however, the property of preserving the enzym

if digested at 37° for 21 hours. Calcium chlorid has the property of slightly increasing the rate of hydrolysis in a 0.1 per cent solution, while it inhibits markedly in a 1 per cent solution."

A contribution to the study of oxydases, R. A. GORTNER (*Jour. Chem. Soc. [London], 97 (1910), No. 568, pp. 110-120*).—A new variety of tyrosinase is described which "is distinguished from the known tyrosinases by its insolubility in water, its loss of vitality in glycerol solutions and on drying, and by its inability to oxidize resorcinol, orcinol, etc.

"A chromogen has been found in the larva of *Tenebro molitor*, giving with tyrosinase color reactions identical with those given by tyrosin.

"Tyrosinase has been found in the myriopods *Scalapocryptops sexpinosa* and *Julius canadensis* n. sp., and also in the larva of *Cucujus clavipes*.

"It has been observed that extracts of almost all animal tissues possess the power of oxidizing solutions of quinol, and that this power is considerably diminished by prolonged boiling.

"Tyrosinase has been found to exist together with laccase in the *Monotropa uniflora*."

About the occurrence of hemicelluloses in the seed coats of the pea (Pisum sativum) and the kidney bean (Phaseolus vulgaris), E. SCHULZE and U. PFENNINGER (*Ztschr. Physiol. Chem., 68 (1910), No. 2, pp. 93-108*).—The seed coats of the pea and kidney bean were examined in the unripe and ripe state and in the fresh and dried condition.

On hydrolyzing the unripe seed coats of peas with 3 per cent sulphuric acid fructose, galactose, and arabinose could be identified. Xylose and mannose were not noted. Calculating from the furfurol produced the sugar sirup contained 45 per cent of pentoses. The ripe seed coats were examined in the same manner and the hemicelluloses were found to be 33.8 per cent of the dry weight of the seed coats. Another test demonstrated with certainty that an increase of the hemicellulose content of the seed coat takes place during the ripening process, 100 unripe seed coats yielding 16.8 gm. and 100 ripe seed coats 17.6 gm. of hemicelluloses. In the sirup obtained by hydrolyzing the ripe seed coats with sulphuric acid fructose and galactose, but no arabinose, could be detected.

With 100 unripe seed coats of the kidney bean, harvested August 10, 19.35 per cent of hemicelluloses was found, and in those gathered September 2, 15.65 per cent, while in the ripe condition, October 1, 48.65 per cent was present. On hydrolysis the unripe seed coats yielded galactose and arabinose, the galactose being easily obtained in crystalline form. The ripe seed coats yielded galactose and arabinose, and the galactose from these could also be crystallized. Fructose was probably present but in very small amounts.

According to the authors, the hemicelluloses serve as the structural material for the seed coats.

Ptomaines from rotted soy beans, K. YOSHIMURA (*Biochem. Ztschr., 28 (1910), No. 1, pp. 16-22*).—From 1 kg. of air-dry rotted soy beans the following amounts of organic bases were isolated: B-Imidazolyläthylamin about 0.18 gm., tetramethylendiamin (putrescin) about 0.25 gm., pentamethylendiamin (Cadaverin) about 0.53 gm., trimethylamin about 0.23 gm., and ammonia 4.60 gm. Histidin, arginin, and lysin were not present.

The fats, J. B. LEATHES (*London and New York, 1910, pp. IX+138*).—This monograph is designed to furnish data as to the present status of, and recent advances in, the chemistry and biology of fats. The chapters are as follows: The fatty acids; glycerol and the glycerids; other alcohols and their fatty acid esters; phospholipines, galactolipines and lipines; the extraction of fat; the estimation of fat in animal tissues; physical properties of fats; general chemical methods used in the analysis of fats; separation, identification and estimation

of constituents of fats—fatty acids, alcohols, phospholipines; and the physiology of fats—biochemical synthesis of fats and higher fatty acids, physiological oxidation of fats, and the rôle of fats in vital phenomena.

The estimation of nitrogen as ammonia, A. GRÉGOIRE (*Bul. Soc. Chim. Belg.*, *24* (*1910*), *No. 5, pp. 221–223, fig. 1*).—The author recommends titrating the ammonia directly. Results obtained in a test of the direct and indirect methods showed the former to possess advantages over the latter. The control test with platinic chlorid indicated that no danger exists in regard to loss by the direct method of titration, but for safety's sake the author recommends the use of a series bulb tube, which is illustrated in the article.

Estimation of the nitrate nitrogen as ammonia, C. FRABOT (*Ann. Chim. Analyt.*, *15* (*1910*), *No. 6, pp. 219–223*).—This is a polemical article with reference to the methods of Pozzi-Escot, Salle, and the author (E. S. R., 22, p. 706; 23, p. 213).

A simple qualitative and quantitative method for separating nitrous from nitric acid, W. M. FISCHER and N. STEINBACH (*Abs. in Chem. Ztg.*, *34* (*1910*), *No. 69, p. 613*).—To the mixture containing the nitrite and nitrate add methyl alcohol, and while passing a stream of air through the solution add dropwise a known volume of titrated sulphuric acid. The methyl nitrite ester which forms boils at −11° C. and is removed by the air current. No nitrate ester forms during the process, not even when a large amount of methyl alcohol is present.

The influence of chlorin upon the determination of nitric nitrogen, R. STEWART and J. E. GREAVES (*Jour. Amer. Chem. Soc.*, *32* (*1910*), *No. 6, pp. 756, 757*).—The results show that chlorin when present in amounts as small as 2.638 parts per million has an influence on the ultimate results obtained by the phenyldisulphonic acid method.

Laboratory methods for organic nitrogen availability, C. H. JONES (*Jour. Indus. and Engin. Chem.*, *2* (*1910*), *No. 7, pp. 308–311*) —Previously noted from another source (E. S. R., 23, p. 9).

The errors in determining nitrogen in the soil, E. A. MITSCHERLICH and E. MERRES (*Landw. Jahrb.*, *39* (*1910*), *No. 3, pp. 346–367*).—When sampling soils in the field for the purpose of studying the transformations in the nitrogenous compounds of the soil, the authors recommend taking one boring per square meter of soil, the number of samples depending upon the results obtained and their correspondence to the conditions as they really exist.

The errors which depend upon rendering the soil air dry for analysis can be so eliminated by the method of Pfeiffer and Ehrenberg (E. S. R., 18, p. 617) as not to enter in when determining the assimilable nitrogen. Nitrogen transformations in the soil can be well detected if the observations are confined to the assimilable nitrogen. Soil extracts should be preserved in carbon dioxid.

Soil humus as determined by different methods, S. LEAVITT (*Jour. Indus. and Engin. Chem.*, *2* (*1910*), *No. 6, pp. 269–271*).—The results are reported of comparative quantitative tests with Stoddart's humic acid,[a] Mooers and Hampton's humus (E. S. R., 19, p. 714) and the official methods with fertile and poor clay loam soils. The author states that many of these soils probably contain the humus largely in the form of protein or protein-like bodies, and that this fact would explain the low results which were obtained with Stoddart's method. It was also found that the humus matter in various soils differs considerably in composition.

Use of phenols in the analysis of alkaline earths, L. LINDET (*Bul. Soc. Chim. France*, *4. ser.*, *7* (*1910*), *No. 10, pp. 434–439; abs. in Analyst*, *35* (*1910*), *No. 413, p. 373*).—The alkaline earth metal oxids dissolve easily and completely

[a] Jour. Indus. and Engin. Chem., 1 (1909), No. 2, p. 72.

in solutions of phenols such as resorcin, hydroquinon, and ordinary phenol. The best results, however, may be obtained with ordinary phenol, which gives a permanent solution and one in which it is possible to titrate the alkali with standard hydrochloric acid. Carbonates, phosphates, silicates, and aluminum and iron oxids are insoluble in phenol.

The results with the method agree well with those obtained by the usual gravimetric methods. The use of the method for examining milk of lime in sugar refineries is discussed.

The detection of inferior ammoniates in commercial fertilizers, J. P. STREET (*Jour. Indus. and Engin. Chem., 2 (1910), No. 7, pp. 311-313*).—This article has particular regard to the detection of inferior inert nitrogen fillers, e. g., some peats, and gives the method in use at the Connecticut State Station, which is as follows:

"Weigh on to a moistened 9 cm. S. and S. No. 595 filter a quantity of the fertilizer equivalent to approximately 45 mg. of organic nitrogen and wash with water at room temperature to about 200 cc. Transfer filter and contents to a 300 cc. low-form Griffin beaker, and digest with 125 cc. of 1.6 per cent neutral potassium permanganate solution in a hot water bath for 30 minutes. Set the beaker down in the bath so that the surrounding water shall be higher than the solution in the beaker, cover with a watch-glass, and stir twice at intervals of 10 minutes with a glass rod. At the end of the digestion remove from bath, add 100 cc. of cold water, and filter through a heavy folded filter. Wash with cold water, small quantities at a time, until the total filtrate amounts to 400 cc. When sufficiently dry to handle, transfer filter and contents to a nitrogen flask and determine nitrogen by the Kjeldahl method. The nitrogen obtained, less the blanks from the two filters used, is the nitrogen not oxidized by the permanganate."

In regard to magnesium ammonium phosphate, K. BUBE (*Ztschr. Analyt. Chem., 49 (1910), No. 9-10, pp. 525-596, pls. 6, fig. 1*).—This contains a critical review of practically all the previous work, and a study in regard to magnesium and ammonium phosphate with particular reference to the estimation of magnesium and phosphoric acid as a magnesium ammonium phosphate.

Analysis of sulphur for agricultural purposes, A. BRUNO (*Abs. in Ann. Chim. Analyt., 15 (1910), No. 6, pp. 235, 236*).—A description of the methods of analysis and judging of sulphur which is to be employed for agricultural purposes.

Determining sulphuric acid by the benzidin method, particularly in the presence of chromium, G. VON KNORRE (*Ztschr. Analyt. Chem., 49 (1910), No. 8, pp. 461-484*).—The results show that benzidin can be protected from the oxidising action of chromic acid in the same manner as from ferric salts, namely, by adding hydroxylamin hydrochlorid to the reagents. To prevent a precipitation of benzidin chromate when potassium bichromate is present, the author recommends rendering the solution acid with hydrochloric acid. In the presence of chromic chlorid the reaction is not quantitative, and heating the solution brings about the formation of complex chromium-sulphuric acid compounds. If, however, the solution is boiled with an excess of sodium acetate or, better, with ammonium formate, these complex combinations are decomposed and it is possible to determine sulphuric acid with benzidin hydrochlorid quantitatively.

The author points out that Friedheim and Nydegger's results[a] with this method in the presence of ferric salts are directly opposite to those obtained by Raschig (E. S. R., 15, p. 337) and the author.

[a] Ztschr. Angew. Chem., 20 (1907), No. 1, p. 9.

Determining barium sulphate in the presence of interfering substances, M. J. VAN'T KRUIJS (*Ztschr. Analyt. Chem., 49 (1910), No. 7, pp. 393–419*).—Previously noted from another source (E. S. R., 22, p. 707).

Volumetric method for barium salts, E. SELVATICI (*Bul. Assoc. Chim. Sucr. et Distill., 27 (1910), No. 9, pp. 862–864; abs. in Chem. Abs., 4 (1910), No. 12, p. 1591*).—This is a modification of Garelli and Ravenna's method and is as follows:

Fifty cc. of a boiling solution of the sample to be examined is placed in a 50 cc. flask, cooled, filled up to the mark, and the suspended matter allowed to subside. Twenty cc. of the solution is then taken in a 100 cc. flask, a few drops of acetic acid added, and 60 cc. of bichromate solution (4.66 gm. of pure potassium bichromate dissolved in water and made up to the 1,000 cc. mark) run in, the flask filled up to the mark, shaken, and the contents filtered. To 50 cc. of the filtrate is added 10 cc. of the potassium iodid solution (KI in HCl), and the iodin set free with thiosulphate solution (23.567 gm. sodium thiosulphate dissolved in water and filled up to the 1,000 cc. mark), estimated, using starch paste as the indicator. As the bichromate and thiosulphate solutions balance, the difference between them represents the amount of potassium bichromate solution combined with the $Ba(OH)_2+8H_2O$.

[**Extraction of plant food constituents**], J. M. BELL (*Jour. Amer. Chem. Soc., 32 (1910), No. 7, pp. 879–884*).—A discussion of the work of Mitscherlich and others (E. S. R., 23, p. 302), with particular reference to the extraction of plant food constituents from the phosphates of calcium and a loam soil, and the usual equation expressing the rate of solution, namely, $dy/dt=k(A-y)$, in which it is claimed that Mitscherlich misinterpreted the meaning of A. The author recalculated Mitscherlich's figures and concludes that "notwithstanding the conditions militating against the use of the ordinary equation for rate of solution, viz, the variable extent of surface and the fact that the phenomenon observed is not one of solution only but also of hydrolysis, this equation describes the data at least as well as the empirical equation proposed by Mitscherlich, Kunze, Celichowski, and Merres. The usual equation for rate of solution also describes very well the extraction of lime from a loam soil by carbonated water."

Analysis of proteins, A. ÉTARD and A. VILA (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 25, pp. 1709–1711; abs. in Analyst, 35 (1910), No. 413, p. 366*).—On the basis of the use of pure methyl alcohol for separating and drying the mixture of amino acids formed by hydrolysis, and the use of barium hydrate in a solution of methyl alcohol as a precipitant of the substances formed,[a] the authors now describe a number of reactions by which these products can be further separated into groups.

By adding sulphuric acid and methyl alcohol to the filtrate obtained from the barium precipitate certain basic substances are separated which can be removed by filtration. This filtrate is then treated with a solution of hydroferrocyanic acid (prepared by treating potassium ferrocyanid with an equal quantity of hydrochloric acid and precipitating the hydroferrocyanic acid with ether) in methyl alcohol, when another group of basic substances is precipitated. The amino acids remaining in the final filtrate are obtained by concentration and crystallization.

About the quantitative determination of peptids, V. HENRIQUES and J. K. GJALDBÄK (*Ztschr. Physiol. Chem., 67 (1910), No. 1, pp. 8–27*).—From the results it appears that with the Sörensen formalin titration method (E. S. R., 19, p. 808) it is possible to determine whether a protein which has been treated

[a] Compt. Rend. Acad. Sci. [Paris], 147 (1908), p. 1323.

with acids or ferments has undergone complete cleavage or not. If the hydrolysis is not complete the amount of bound peptids can be estimated.

Detection of peptolytic ferments in animal and vegetable tissues, E. ABDERHALDEN (*Ztschr. Physiol. Chem.*, *66* (*1910*), *No. 3*, *pp. 137–139*).—The author has previously drawn attention to the possible errors obtained with Buchner's method (E. S. R., 23, p. 512) in the search for ferments. Two methods are described for the detection of peptolytic ferments, one being based on the formation of tyrosin from silk peptone, and the other on the reaction obtained for tryptophan where a polypeptid containing tryptophan is used, respectively, glycyl-l-tryptophan.

A new method for the quantitative estimation of hydrocyanic acid in vegetable and animal tissues, A. D. WALLER (*Proc. Roy. Soc.* [*London*], *Ser. B*, *82* (*1910*), *No. B 559*, *pp. 574–587*, *figs. 5*).—The test is a colorimetric one and is based on the fact that a red color is produced when sodium picrate (picric acid and sodium carbonate) and hydrocyanic acid are brought together. The color standards which are prepared with known amounts of sodium picrate and hydrocyanic acid are very stable and not appreciably affected by sunlight and boiling.

The results of experiments as to the time relation of the electrical and chemical changes taking place in anesthetized laurel leaves and the quantitative estimation of hydrocyanic acid in the blood and tissues of animals and man after death by hydrocyanic poisoning are given.

Quantitative colorimetric determination of small amounts of hydrocyanic acid, E. BERL and M. DELPY (*Ber. Deut. Chem. Gesell.*, *43* (*1910*), *No. 8*, *pp. 1430, 1431*; *abs. in Jour. Soc. Chem. Indus.*, *29* (*1910*), *No. 13*, *p. 813*).—The method can be employed for quantities running from 4 to 0.04 mg. in 1 cc. of liquid, and within a limit of error of 5 per cent.

The solution to be examined is rendered slightly alkaline by a potassium hydroxid solution (1:1). An oxidized solution of ferrous sulphate (1:30) is added in the proportion of 2 molecules of ferrous sulphate to each molecule of hydrocyanic acid. The solution is allowed to stand at ordinary temperature for 10 minutes, with frequent shaking, boiled for from 2 to 15 minutes according to the amount of hydrocyanic acid, allowed to cool, and rendered acid with 10 per cent hydrochloric acid. If at the expiration of 5 hours the liquid is not colored, it should be made up to a bulk of 100 cc., shaken and compared with a standard solution of hydrocyanic acid made up in the same manner as the above. If, on the other hahd, the liquid is colored it is carefully poured off from the Prussian blue precipitate and distilled water added to take its place.

The determination of chlorophyll in plants, H. MALARSKI and L. MARCHLEWSKI (*Biochem. Ztschr.*, *24* (*1910*), *No. 3–5*, *pp. 319–322*; *abs. in Zentbl. Physiol.*, *24* (*1910*), *No. 9*, *p. 403*).—The method consists of preparing a standard solution of chlorophyllan from the kind of plant to be examined and determining its extinction coefficient in a chloroform solution. The chlorophyll of the plant to be examined is then extracted and the extinction coefficient determined and compared with the standard solution.

About starch estimation methods, F. SCHUBERT (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw.*, *39* (*1910*), *No. 3*, *pp. 411–422*).—The author has modified Lintner's method (E. S. R., 20, p. 1008) in so far that a measured amount of water and acid is brought into the receptacle containing a weighed amount of the starchy material filtered directly without washing out the measuring flask or filling up to the graduation mark, and polarized at once. The phosphomolybdic acid used for clarifying is contained in the water used for doughing

the starchy material. The method is useful in determining the starch content of cereals and similar materials in culture experiments.

The occurrence of raffinose in raw sugar and its determination, F. STROHMER (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 4, pp. 649–666; Ztschr. Ver. Deut. Zuckerindus., 1910, No. 656, II, pp. 911–931*).—After discussing the discovery and preparation of raffinose and the evolution of the methods for determining it, the author draws attention to the fact that raffinose is not usually present in the sugar beet and is only formed temporarily under conditions which have not yet been determined. Neither is it produced during the manufacture of raw sugar, being present only in the by-products. There are no external characteristics which will enable one to detect a sugar containing raffinose. Herzfeld's inversion method [a] yields accurate results with a pure mixture of saccharose and raffinose but only approximate figures with raw beet sugar. The plus polarization observed in the method in most instances is derived from optically active nonsugars, chiefly torrefaction products, and not from raffinose.

Bagasse analysis: Determination of sugar and moisture, R. S. NORRIS (*Hawaiian Sugar Planters' Sta., Div. Agr. and Chem. Bul. 32, pp. 34, figs. 2*).—As the analysis of bagasse is an important factor in judging the percentage yield of sugar from the cane, the author investigated the methods of analysis. It is shown that the method of sampling is the most important feature of the analysis. The bagasse loses much moisture in the process of chopping, and this must be taken into consideration when weighing off the samples. A fine division of the bagasse samples is absolutely necessary. The author suggests, on the basis of his results, methods for moisture and sugar determination and sampling.

"In determining the polarization of bagasse by digestion in water, the digestion should be continued for an hour to insure a homogeneous diffusion of the solution through the bagasse. No other dextro-rotatory substance than sugar is extracted or produced from bagasse from Hawaiian cane by boiling with water. . . . Two cc. of a 5 per cent solution of sodium carbonate to 50 gm. of bagasse was found to be the most convenient reagent to use in the water for digestion. In digesting bagasse in water the solution should be mixed occasionally to insure a homogeneous diffusion. No water should be added to the solution after digestion. The same results are obtained by water digestion for 1 hour and by extraction with alcohol or water for 1½ to 2 hours. . . . Bagasse samples dry very much more quickly when spread out in a thin layer than in thick masses. A 3-in. layer of bagasse can not be depended upon to have lost all its moisture in 7 hours at 100 to 105° C. Bagasse can be dried safely at 125° in 3 hours."

A bibliography is appended.

The quantitative estimation of salicylic acid in jams, jellies, and comfits, T. VON FELLENBERG (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 2, pp. 63–70*).—Tests were conducted with cherry, currant, bilberry, quince, plum, apple, apricot, strawberry, and blackberry products and with a method which is a combination of the Harry and Mummery method (E. S. R., 16, p. 1052), and the Freyer method (E. S. R., 8, p. 466) for the titration of salicylic acid which is based on the formation of tribromphenol when bromin is added to salicylic acid. The limit of error with the method is about 0.01 gm. salicylic acid per kilogram of comfit.

Schardinger's reaction with cow's milk, P. H. RÖMER and T. SAMES (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 1, pp. 1–10*).—This work has par-

[a] Ztschr. Ver. Rübenz. Indus., 38 (1888), pp. 699, 742, 1197; 40 (1890), p. 167.

ticular reference to the Schardinger formaldehyde-methylene blue reaction of freshly drawn milk.

Attention is called to the ease with which this reaction can be imitated with boiled milk and milk which does not give the reaction by adding a little ferrous sulphate. Fresh milk when exposed to the ultraviolet light for 1 hour did not lose its capacity for decolorizing formaldehyde-methylene blue, but lost its faculty for producing the oxydase reaction. Dialyzing tests also showed a difference between the oxydase and the reductase test. Milk from the same animal on successive days gave reactions of various intensities, which the authors believe to be due to the fact that these milks were drawn at a later time than the regular milking hour. The first stream of the milk with a fat content of 0.7 per cent gave no reductase but an oxydase reaction. The average milk of the same batch (fat 3.2 per cent) gave a positive reductase and oxydase reaction, while the strippings, with a fat content of 8.8 per cent, gave both reactions very intensely.

The authors are not willing to say that the absence of the formaldehyde-methylene blue reaction in the initial milk was due to the low fat content. See also previous observations on the Schardinger reaction by Schern (E. S. R., 21, p. 614).

A simplified method for examining butter and oleomargarine, E. Glimm (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 11, pp. 644–651, fig. 1*).—Three methods of operating are described.

The apparatus used for all of the tests consists of a bell-shaped funnel having a bulb blown in the upper portion of the outflow tube and an Erlenmeyer flask of 150 cc. capacity. The filter employed is of asbestos, while the bulb of the funnel is filled with glass wool till it reaches the base of the asbestos filter layer above. The apparatus, funnel, filter, and Erlenmeyer flask, are weighed before proceeding with the determination proper.

In one of the methods about 5 gm. of the fat, which has been previously rubbed up until it has the consistency of an ointment, is brought upon the filter and dried at from 95° to 98° C. for 2 hours in the vacuum oven. The weight lost is considered water. The fat remaining on the filter is dissolved and washed into the Erlenmeyer flask with carbon tetrachlorid. (This process can be accelerated by placing the apparatus on the water bath.) The washing is continued until a drop from the filter evaporated on a watch glass leaves no residue; the funnel and the filter are then dried at 95° to constant weight and weighed, the difference in weight from the original dry fat representing the actual fat present. This can be verified by drying and weighing the residue in the Erlenmeyer flask.

The funnel containing the material not fat is placed on a tared 100 cc. measuring flask and by washing with warm water and suction the lactose and salt are dissolved out. The salt is then determined in the usual manner, the casein remaining on the filter is weighed, and the difference between the two weights represents the milk sugar. The method compares well with the von Bengen method (E. S. R., 20, p. 1109). Numerous analyses are appended.

[Reports on the chemistry and uses of the prickly pear, candelilla wax, and canteloups], (*New Mexico Sta. Rpt. 1909, pp. 18–21*).—The chemical department reports the progress made in the production of alcohol from tunas (E. S. R., 22, p. 13), and of studies of candelilla wax and canteloups (E. S. R., 23, pp. 615, 711). Attempts to make jelly from the tuna resulted in producing a palatable sirup, but the tuna did not jell.

A chemical study of the tuna (*Opuntia leavis*) showed the following results: "On August 17 [the pears] were found to contain only 6.87 per cent sugar. Analyses made every few days showed the percentage of sugar to gradually increase, until a month later it amounted to 11.92 per cent. The percentage of

acid, on the contrary, gradually decreased from 0.28 per cent on August 17 to 0.04 per cent on September 17. These facts should prove of some value to those who now use these fruits for making preserves, or who may use them for making alcohol or for other purposes."

Utilizing tomato residues, F. PERCIABOSCO and F. SEMERARO (*Staz. Sper. Agr. Ital., 43 (1910), No. 3, pp. 260–272; abs. in Chem. Zentbl., 1910, II, No. 3, pp. 169, 170*).—The authors found that an oil can be profitably extracted with carbon disulphid from tomato residues. It is of a yellow color and well adapted for soap manufacture. The dregs therefrom are high in digestible nitrogenous substances and can therefore be utilized as a stock feed or as a fertilizer.

Homemade vinegar, B. FALLOT (*Sci. Amer. Sup., 70 (1910), No. 1808, p. 135, fig. 1*).—The author describes a simple process for vinegar production.

Salting and curing cucumber pickles, F. F. HASBROUCK (*Pure Products, 6 (1910), No. 9, pp. 509–514*).—Attention is called to the inaccuracies which exist in various "saltometer" scales. In view of these the author recommends utilizing a Beaumé hydrometer for the purpose. Directions for salting down are given, and measures to prevent a too rapid and abnormal fermentation of the cucumbers are suggested.

Prepared mustard, F. F. HASBROUCK (*Pure Products, 6 (1910), No. 8, pp. 446–449*).—A description of the details involved in the manufacture of prepared mustard.

The influence of mushy pears upon the fermentation of the juice, H. MÜLLER (*Landw. Jahrb. Schweiz, 24 (1910), No. 4, pp. 268–273*).—The results show that a change in the kind of organized ferments takes place when pears are allowed to become soft, and that this is unfavorable to the subsequent fermentation of the juice. During the softening process certain bodies are formed in the pear which produce a slower and incomplete fermentation and which, in conjunction with the loss in acid and tannin which takes place, allows the bacteria to gain the upper hand, causing the formation of bodies such as mannit, lactic acid, acetic acid, and esters and reducing the quality of the resulting perry.

Pear tannin and its decomposition during the preparation of perry, P. HUBER (*Landw. Jahrb. Schweiz, 24 (1910), No. 4, pp. 294–298*).—The author draws attention to the importance of preventing the decomposition of the tannin by long storage, particularly where soft, overripe, and cut fruit is used. Turbidity in otherwise normal perrys is due to the presence of either an excess or to a too small amount of tannin in the pear. Various recommendations are made for preventing and remedying the turbidity.

The manufacture of light natural wines in the Cape Colony, P. D. HAHN (*Agr. Jour. Cape Good Hope, 37 (1910), No. 1, pp. 53–62*).—A discussion in regard to the correct scientific principles involved in making wine at this place.

Souring the mash, H. LANGE (*Pure Products, 6 (1910), No. 10, pp. 591–599*).—A description of the methods for souring the mash for the purpose of insuring a uniform and normal fermentation process in yeast making and alcohol manufacture.

Operation of small rye distilleries, G. ELLRODT (*Pure Products, 6 (1910), No. 9, pp. 528–533*).—This article treats briefly of a method of producing alcohol from rye, and describes the chemical and biological control of the process.

Denatured alcohol from cantaloups, S. R. MITCHELL (*Cal. Cult., 35 (1910), No. 8, p. 178*).—The author points out that it would not pay to grow cantaloups for producing denaturized alcohol.

The amount of spirits that may be extracted from a ton of raisins, A. J. PERKINS (*Dept. Agr. So. Aust. Bul. 30, pp. 8*).—Previously noted from another source (E. S. R., 22, p. 416).

METEOROLOGY—WATER.

Weather forecasting by simple methods, F. S. GRANGER (*Nottingham, 1909, pp. XII+121; rev. in Nature [London], 82 (1910), No. 2098, p. 307*).—The author states that the purpose of this book "is to answer the question, 'When will it rain?' in a simple and intelligible manner." It summarizes "the results of the observations of more than 50 years, made with the one object in view of finding out the purpose of each type of cloud and atmospheric change." No use is made of records of instruments, but simply of visual observations on clouds, thunderstorms, diurnal breezes, haze and colors of the sky, and similar phenomena.

Variations in the distribution of atmospheric pressure in North America, H. ARCTOWSKI (*Bul. Amer. Geogr. Soc., 42 (1910), No. 4, pp. 270–282, figs. 6*).—In continuation of previous studies on temperature (E. S. R., 22, p. 313), the author analyzes the annual departures from the general means of pressure for the period 1876 to 1900 at Jacobshavn, Berufjord, Stykkisholm, Tromsö, Aalesund, Brussels, Ponta-Delgada, Lisbon, Madrid, Aberdeen, Valencia, Duluth, Denver, Galveston, Montreal, Toronto, Washington, Nashville, and Mobile. The results "suggest the existence of waves whose propagation is so slow as to take 2 or 3 years to cross the United States, from the Atlantic to the Pacific coast." A certain correlation in pressure between North America and Iceland is traced and a periodicity corresponding with the frequency of sun spots is indicated. In general the studies on variations in pressure confirm the principal results of the studies in temperature indicating that "there exists a dynamical climatology and [that] the study of the dynamics of climates is perfectly possible."

Weather summary, L. R. WALDRON and O. GRACE (*North Dakota Sta., Rpt. Dickinson Substa., 1909, pp. 66, 67*).—Tabular summaries of observations on precipitation, temperature, and early and late frosts, 1906 to 1909, are given. The mean annual temperature of 1909 was 40.2° F. as compared with the four-year average of 40.3°; the precipitation was 21.26 in. as compared with the four-year average of 15.11 in.; the average number of days between frosts for the four seasons was 103.

Fifth annual report of the meteorological committee (*Ann. Rpt. Met. Com. [Gt. Brit.], 5 (1910), pp. 147, pls. 10, figs. 3*).—This consists as usual of administrative reports regarding organization and operations (during the year ended March 31, 1910) in marine meteorology, forecasts and storm warnings, climatology, publications, investigation of the upper air, and miscellaneous subjects, with appendixes as follows: Financial statement, supply of information to the public, lists of observers who sent in "excellent" meteorological logs during the year and of logs and documents received from ships, distribution of instruments, report on inspection of meteorological stations, and lists of persons and institutions from whom publications and meteorological data have been received and to whom publications are sent.

The climate of Switzerland, J. MAURER, R. BILLWILLER and C. HESS (*Das Klima der Schweiz. Frauenfeld, 1909, vol. 1, pp. VIII+302, pls. 5, figs. 9*).—This book is based upon a 37-year period (1864–1900) of observations by the Central Meteorological Institute, as well as upon series of earlier observations at other places in Switzerland. A brief history is given of Swiss meteorology, and data on pressure, temperature, precipitation, and sunshine are summarized and discussed for Switzerland as a whole, and on temperature, humidity, cloudiness, sunshine, precipitation, and wind for different sections of the country. An appendix contains a special chapter on storms and hail.

Climate and meteorology of Australia (*Off. Yearbook Aust., 3 (1901–1909), pp. 79–109, dgms. 3, maps 2*).—This is a summary of available data on this sub-

ject compiled by H. A. Hunt, commonwealth meteorologist of Australia. The article also gives the history of Australian meteorology, describes the organization and publications of the meteorological service of the commonwealth, and discusses the influences which affect Australian climate.

Hail protection, A. TROLLER (*Nature [Paris], 37 (1909), No. 1890, pp. 175, 176, fig. 1*).—This article briefly describes experiments which have been undertaken by Négrier and by de Beauchamp (E. S. R., 22, p. 118), with a view to warding off hail storms by means of high towers carrying conductors which draw off the atmospheric electricity.

Hail protection in Beaujolais, J. VIOLLE (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 18, pp. 1087–1090; Bul. Soc. Nat. Agr. France, 70 (1910), No. 6, pp. 470–476; abs. in Rev. Sci. [Paris], 48 (1910), I, No. 20, p. 635*).—Statistics are presented indicating a much smaller loss from hail in the Province of Beaujolais during the 6 years 1901 to 1906, in which cannonading was practiced as a protective measure, than during the preceding 10 years, when no attempts at protection were made. The negative results obtained in the government trials at Castel-Franco, near Venice, are referred to, but the author maintains that the conditions there were such that the results do not have general application.

The water supply of Indiana, H. E. BARNARD and J. H. BREWSTER (*Ann. Rpt. Bd. Health Ind., 27 (1908), pp. 345–373, dgms. 2*).—This article reports and discusses the results of analyses of 918 samples of water from different parts of Indiana.

Of the 288 samples of deep well waters examined, 220 were of good quality, 47 were so polluted as to be classed as bad, and 21 were of doubtful quality. Of the 419 samples of shallow well water examined, 166 were of good quality, 209 unqualifiedly bad, and 44 of doubtful quality. Of the stream supplies examined, 25 were good, 7 bad, and 1 doubtful. Of the 36 pond or lake supplies examined, 24 were of good quality, 5 were bad, and 7 of doubtful quality. Of the 47 spring waters analyzed, 37 were of good quality, 1 was grossly polluted, and 7 were doubtful. Of the 27 samples of cistern water 14 were of good quality and 13 were polluted.

Of the 190 analyses of water from public supplies, 111 were from deep wells, 8 from shallow wells, 33 from streams, 31 from ponds or lakes, and 7 from springs. "Of the deep well supplies, 104 were of good quality, 2 were bad, and 5 were doubtful. The deep well waters used as public supplies are for the most part of excellent quality from a sanitary standpoint. . . . Of the 33 river supplies, 22 were of good quality, 7 were bad, and 1 was doubtful. . . .

"Of the private supplies, 177 were deep wells, 411 shallow wells, 5 ponds, 40 springs, and 27 cisterns. One hundred and sixteen of the deep well waters were of good quality, 45 were bad, and 16 doubtful. But 159 of the 411 shallow well waters were potable, 209 were unequivocally bad, and 43 were of doubtful quality. The shallow well is never a satisfactory source of water supply, and except in rare instances, when it is located far distant from any possible source of pollution, should never be used until a thorough analysis has shown it to be uncontaminated by human filth. The continued use of shallow wells by city and town dwellers is a reproach upon our intelligence."

The combined action of nitrous gas and oxygen on water, FOERSTER and KOCH (*Monit. Sci., 4. ser., 24 (1910), I, No. 821, pp. 306–333, figs. 5*).—This is a detailed technical study of this subject.

Sterilization of water by means of quartz lamps, M. VON RECKLINGHAUSEN (*Jour. Roy. Sanit. Inst., 31 (1910), No. 5, pp. 172–175, fig. 1*).—The development of this process is explained, and an apparatus capable of effectively sterilizing 8,500 cu. ft. of water per hour is described.

Hypochlorite sterilization of water (*Surveyor, 37* (*1910*), *No. 960, pp. 819–821*).—The successful use of this method of sterilization at Nashville, Tenn., Minneapolis, Minn., Montreal and Toronto, Can., Harrisburg, Pa., Quincy, Ill., Hartford, Conn., and Jersey City, N. J., is described. See also a previous note (E. S. R., 23, p. 619).

Killing germs by light, G. LOUCHEUX (*Sci. Amer. Sup., 70* (*1910*), *No. 1809, pp. 157, 158, figs. 9*).—Brief descriptions are given of various processes which have been proposed for the utilization of ultraviolet rays in the sterilization of liquids, particularly water.

SOILS—FERTILIZERS.

Introduction to the study of the soil solution, F. K. CAMERON (*Jour. Phys. Chem., 14* (*1910*), *No. 5, pp. 393–451*).—This is a continuation of an article on this subject to which attention has already been called (E. S. R., 23, p. 223), in which the subject is treated under the following heads: Soil management or control, soil analysis and the historical methods of soil investigation, the plant food theory of fertilizers, the dynamic nature of soil phenomena, the film water, the mineral constituents of the soil solution, absorption by soils, relation of plant growth to concentration, balance between supply and removal of mineral plant nutrients, organic constituents of the soil solution, fertilizers, and alkali.

The author is of the opinion that "the evidence at hand indicates that the various processes taking place in the soil as a whole continually tend to form and maintain a normal concentration of mineral constituents in the soil solution. . . . The soil is a system continually subject to outside forces and influences, and . . . is of necessity a dynamic system. It is doubtful in the extreme if any soil in place is ever in a state of final stable equilibrium. It would be natural, therefore, to expect and to find that even if the solution in the soil were directly dependent on the solubility of the soil minerals alone and were continually tending toward a definite normal concentration, actually this concentration would seldom if ever be realized. Most important in this connection is the fact that the concentration of the soil solution is always dependent in some degree upon the concentration of the soluble constituents in the solid phases in other than definite chemical combinations."

The conditions which bring about excessive accumulation of soluble salts (alkali) and the principles underlying the removal of alkali by irrigation and drainage are quite fully discussed.

"The rate at which alkali can be leached from a soil is dependent in a large measure upon the absorptive properties of the soil, and to some extent upon the nature of the salts composing the alkali. The leaching is more rapid from sandy than from clay soils, and white alkali is leached more readily than is black. In general, however, the same laws hold here as in any leaching of a solute from an absorbent, and it has been shown that even in the case of black alkali, the rate of removal under a constant leaching follows the law $dx/dt = K(A-x)$. In practice, the water does not percolate through the soil under a constant 'head,' but the flow is intermittent, so that the value of the above formula is mainly academic. On the other hand, if the drainage between floodings is thorough, this procedure should be more efficient than any other for causing a rapid removal of the alkali salts, if, as is generally the case, a limited quantity of water is available."

On the influence of water solutions of common salt on the permeability of soils, L. G. DEN BERGER (*Bul. Dépt. Agr. Indes Néerland., 1910, No. 34, pp. 20, fig. 1, charts 2*).—In the investigations here reported the effect of salt solutions of varying strength on the permeability of soils was tested under different

conditions. The results showed that the marked effect of such solutions on the permeability is due to the puddling of the soil and the consequent destruction of the crumbly structure, the breaking down of zeolitic materials, and changes in the volume of the soil colloids.

Studies in the rotations, L. R. WALDRON and O. GRACE (*North Dakota Sta., Rpt. Dickinson Substa., 1909, pp. 39–59, figs. 4*).—The results of a mechanical analysis of the soil and of determinations of soil moisture under different methods of cropping in the rotation experiments carried on in cooperation with the Bureau of Plant Industry of this Department are reported and discussed.

Data are also given for the precipitation and evaporation during the growing seasons from 1907 to 1909. The latter show that as a general rule the evaporation varies inversely as the precipitation. With the precipitation during the growing season, May to September, 11.95 in. in 1907, 10.63 in. in 1908, and 17.17 in. in 1909 the corresponding evaporation was 24.53, 27.48, and 23.83 in.

Yields of corn, wheat, oats, and barley on the moisture conservation plats are reported, but the results are not considered conclusive.

The free humus acids of upland moors, A. BAUMANN and E. GULLY (*Mitt. K. Bayr. Moorkulturanst., 1910, No. 4, pp. 31–156, figs. 8*).—This is an account of a detailed investigation undertaken to determine whether the so-called free "humus acids" and "sphagnum acids" are identical, the relation of colloids to the acid reactions of sphagnum and peat moss, and the absorptive properties of these substances in relation to acid conditions.

The investigations showed that there are no free humus acids in peat moss, but that the acid reactions observed are due to the absorbent power of the colloids of the cell covering of the hyalinesphagnum cells. The general conclusion is drawn that there are no free humus acids in upland soils, but that the absorbent properties of the sphagnum bring about conditions which indicate the presence of acids.

The author maintains that it is not possible to determine directly acid or basic conditions by means of indicators in either insoluble substances like sphagnum and peat moss or in pseudosolutions, but only in homogeneous solutions.

The covering of soil particles, J. DUMONT (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 23, pp. 1087–1089; abs. in Chem. Zentbl., 1910, I, No. 6, p. 469*).—The author studied these coverings or crusts by treating a soil, poor in lime, with oxalic acid and ammonia. It was found that like quantities of sand contained more of the crust in proportion to the fineness of the particles, and that the crust consisted of the same materials, namely, fine sand, silt, and colloid substances, as are separated by ordinary methods. Comparing the physical composition of these crusts with that of the soil from which they were formed, it was found that the crusts contained ten times as much humus and five times as much clay as the soil as a whole. The quantitative composition of the crust appeared to depend absolutely upon that of the soil.

The causes of the formation of hardpan (ortstein), A. MAYER (*Fühling's Landw. Ztg., 59 (1910), No. 9, pp. 315–320*).—In this article the author shows how hardpan is formed in the lower layers of the soil by the accumulation of humus and basic constituents removed from the upper layers of the soil. These constituents are dissolved by the rain water which becomes saturated with the humus acids. The exhausted sands of the upper layers of the soil constitute the so-called "bleisand."

Analyses of "bleisand," ortstein, and ordinary sandy soil are given, which illustrate clearly the process described.

Rôle of mica in cultivated soil, BIÉLER-CHATELAN (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 18, pp. 1132–1135; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 11, p. 709; Chem. Abs., 4 (1910), No. 14, pp. 1885, 1886; Rev. Sci.*

[Paris], *48 (1910), I, No. 20, p. 636)*.—Prianishnikov has shown (E. S. R., 17, p. 842) that muscovite supplies more potash to plants than orthoclase. The author shows that this is due to the greater solubility of the muscovite in water. Ground muscovite dissolved at the rate of 0.48 part of potash per 1,000 of water, while more finely ground orthoclase yielded only 0.2 part. The solubility of the potash of muscovite was increased by the addition of gypsum to 1.02 parts, of peat to 1.05 parts, of ammonium sulphate to 1.55 parts, of quicklime to 1.70 parts, of 1 per cent citric acid to 1.85 parts, of monocalcium phosphate to 2.24 parts, and of cold concentrated hydrochloric acid to 2.9 parts.

Examinations of soils of the Rhone Valley showed the presence of from 15 to 20 parts per 1,000 of mica yielding 30 parts per 1,000 of potash, yet these soils yielded comparatively little potash to carbonated or boiling water, less than that given in a previous note (E. S. R., 23, p. 121), as indicating the need of potash fertilizers. Still, with the exception of rapidly growing plants like asparagus, potash fertilizers did not increase the effect of superphosphate alone on these soils. The result is attributed partly to the mobilizing effect of the superphosphate and partly to the power of the roots to assimilate the so-called insoluble potash of the soil.

It was found in pot experiments that rye grass was able to assimilate potash from mica which had previously been extracted with hydrochloric acid. The author is of the opinion that mica furnishes to plants not only potash but magnesia and fluorin, the latter being considered of importance in the nutrition of plants and animals.

The composition of Ethiopian soils, A. MAZZARON (*Agr. Colon. [Italy], 4 (1910), Nos. 4, pp. 220–232, map 1; 5, pp. 263–273*).—Analyses of a large number of samples of soils collected in the drainage basin of Lake Tzana are reported and discussed.

On irrigated leucite soils, G. DE ANGELIS D'OSSAT (*Atti R. Accad. Lincei. Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 19 (1910), I, No. 9, pp. 575–578; abs. in Chem. Zentbl., 1910, II, No. 6, p. 403*).—Some of the practical results of previous studies by the author on the amount and solubility of fertilizing constituents in such soils are briefly reviewed.

Spinach troubles at Norfolk and improvement of trucking soils, L. L. HARTER (*Virginia Truck Sta. Bul. 4, pp. 61–80, figs. 5*).—An account is here given of observations made on the general condition of trucking soils near Norfolk, Va., in connection with a study of malnutrition diseases of spinach. The work was an outcome of cooperative experiments by the station and the Bureau of Plant Industry of this Department. The relation of rainfall to disease is briefly considered and the manurial needs of the soil and means of supplying them are discussed in some detail.

In general it was found that the lack of humus in the soil was the principal fault, analyses showing as low as 0.52 per cent of this substance. To correct this fault the use of barnyard and green manures in a proper rotation of crops is recommended The functions of micro-organisms and the relation of lime to the micro-organisms and humus in the soil are discussed. It was found that nitrifying and root tubercle organisms were unable to thrive in the Norfolk soils and their failure is attributed to the lack of organic matter and the presence of acids in the soil.

The negative influence of soils upon the nitrogen content of wheat, G. W. SHAW (*Abs. in Science, n. ser., 32 (1910), No. 823, pp. 479, 480*).—This is an abstract of a paper presented at the San Francisco meeting of the American Chemical Society, which summarizes the results of experiments with wheat grown at the California Station on typical soils brought from different wheat growing areas of the United States. The results in general indicate that the

deterioration in milling quality which the wheat underwent when grown in California was due to climatic rather than soil conditions.

Maintenance of soil fertility: Plans and summary tables (*Ohio Sta. Circ. 104, pp. 20, dgms. 5*).—This circular is one of the annual statements on this subject (E. S. R., 21, p. 216) and brings the data for the experiments up to the end of 1909.

The fertility of the soil, A. D. HALL (*Science, n. ser., 32 (1910), No. 820, pp. 363–371; Sci. Amer. Sup., 70 (1910), No. 1819, pp. 314, 315*).—This is a review of scientific investigations bearing on this subject, beginning with the experiments of Van Helmont in the seventeenth century and closing with the recent work of Russell and Hutchinson on the functions of protozoa in the soil, the purpose being to show "the continuous thread which links the traditional practices of agriculture with the most modern developments of science."

Infection experiments with nitragin, WLSTMANN (*Ztschr. Landw. Kammer Schlesien, 13 (1909), No. 14, pp. 410–416, figs. 6*).—The results of infection experiments carried on for many years with serradella, in which the seeds were inoculated with nitragin cultures, showed a marked increase in yield of green fodder from the inoculated plats over the uninoculated, amounting in some instances to as much as 600 per cent.

A report on inoculation experiments, K. BRUX (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 7 (1909), No. 10, pp. 133–136, fig. 1; abs. in Centbl. Bakt. [etc.], 2. Abt., 27 (1910), No. 10 12, p. 256*).—The results of inoculation experiments with nitragin on clover, lupine, serradella, and beans showed a marked increase in the yield of green fodder from inoculated plats over the yield from uninoculated.

On the cooperation of micro-organisms in the utilization of insoluble phosphates of the soil by plants, S. DE GRAZIA (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 3 (1909), pp. 203–208*).—Previously noted from another source (E. S. R., 23, p. 20).

On the part bacteria play in fertilizing operations, P. EHRENBERG (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 4, pp. 915–926*).—The author discusses the decomposition of solid and liquid stable manures by bacteria, both before and after they are put on the field, the resulting losses and benefits, and the conditions under which such processes occur. The part that bacteria play in making available green manures, lime nitrogen, and phosphoric acid, and the processes of nitrogen fixation in the soil by symbiotic bacteria, are also discussed.

Field tests with plant foods, materials and results, H. A. HUSTON (*Abs. in Science, n. ser., 32 (1910), No. 823, p. 479*).—This is an abstract of a paper presented at the San Francisco meeting of the American Chemical Society, which discusses the results of fertilizer experiments on wheat by experiment stations in the winter wheat section of the United States. It is stated that the results of these tests indicate that the use of commercial fertilizers on winter wheat is unprofitable and that this is apparently in conflict with practical experience.

Green manuring (*Landw. Ztschr. Rheinprovinz, 11 (1910), No. 28, pp. 423, 424*).—This article discusses (1) the crops best suited to green manuring, (2) the time to sow crops, and (3) the depth to plow. In general those plants rich in nitrogen and making the most growth in a short time are best. Shallow plowing as a rule is recommended.

Poultry manures, their treatment and use, W. P. BROOKS (*Massachusetts Sta. Circ. 22, pp. 4*).—Recent analyses by the station of poultry manures of different ages and treated in various ways are reported and methods of preservation are discussed.

The results emphasize "the fact that hen manure unmixed with absorbents or chemicals suffers very rapid loss of nitrogen," and that this loss can be effectively prevented by "the free use of fine dry loam, or the admixture of such materials as kainit, acid phosphate, muriate of potash or land plaster, or of a combination of some of these."

Urine-earth as a manure, D. Clouston (*Agr. Jour. India, 5 (1910), No. 3, pp. 262, 263*).—Tests are reported which indicate that the urine of a bullock conserved for a certain period by means of dry earth was equal in manurial value to the dung of the same animal for a like period.

The dry-earth system of preservation of urine used was as follows: "Dry earth to a depth of 6 in. is spread in the stalls. The dung is removed daily and stored in a pit. The urine-earth is removed from the stalls and stored in the same pit after having lain about a month in the stalls; fresh earth is put in its place. By removing the dung daily the stalls are kept clean. Should the earth get caked, the surface is scarified by means of a phowra (scraper) in order to make it pervious to the liquid manure. By this method both the liquid and solid excreta are saved."

Recent investigations on the action and properties of lime nitrogen, A. Stutzer, F. Reis and F. Söll (*Fühling's Landw. Ztg., 59 (1910), No. 12, pp. 413–420*).—Investigations on the action of cyanamid and dicyandiamid on micro-organisms, germinating seeds, and growing plants and animals, and the changes which these substances undergo in the soil, are briefly reviewed.

It is shown that cyanamid may be utilized by micro-organisms as a source of nitrogen, but that dicyandiamid can not be so used. The injurious effect of these substances on germinating seeds and smaller animals was confirmed. They were found, however, to be efficient fertilizers for the higher plants. The fertilizing action of the lime nitrogen is ascribed mainly to the ammonia which is produced in the soil, and the formation of ammonia should therefore be promoted in every possible way. The transformation is thought to be due less to micro-organisms than to the chemical action of certain soil constituents.

The author holds that the fear that under the ordinary conditions of agricultural practice any considerable amount of dicyandiamid will be formed from the lime nitrogen is not well founded.

Chemical and physiological experiments with cyanamid and derivatives, F. Reis (*Biochem. Ztschr., 25 (1910), No. 6, pp. 460–493; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 12, pp. 774, 775*).—This article describes methods of determination of calcium cyanamid and its derivatives, dicyandiamid, dicyandiamidine, and diguanid, and the behavior of these compounds under different conditions, particularly under varying soil conditions.

It was shown that calcium cyanamid poisons bacteria, molds, seedlings, and growing plants if used as the exclusive source of nitrogen. It was also shown to be poisonous to animals. Certain micro-organisms can use cyanamid and the derivatives named above when in concentrations of less than one part per thousand of water. When applied to well established plants these compounds appear to be of some value as a fertilizer in certain cases, but of little or no value in other cases. Germination was retarded in all cases. Since cyanamid has been shown in practice to be of decided fertilizing value it is evident that it undergoes transformations in the soil which destroy its poisonous properties.

The agricultural utilization of atmospheric nitrogen, Zuzak (*Wiener Landw. Ztg., 60 (1910), Nos. 58, pp. 596–597; 59, pp. 604, 605*).—This article is a résumé of the contributions to the knowledge of the utilization of atmospheric nitrogen for agricultural purposes. The composition and fertilizing effects of commercial calcium cyanamid and calcium nitrate are reported.

Experiments on the availability of nitrogen in peat, peat moss, and elephant dung as compared with certain other manures, H. E. ANNETT (*Agr. Jour. India, 5 (1910), No. 3, pp. 255-261*).—Samples of peat containing 0.59 per cent of nitrogen, peat moss containing 0.69 per cent nitrogen, and elephant dung containing 1.09 per cent nitrogen were tested in comparison with cattle manure and castor-oil cake in pot experiments with corn on alluvial soil. As measured by the total crop and yield of grain the oil cake gave by far the best results. "From the yields of dry matter and from the percentage of nitrogen recovered, peat moss, peat, elephant dung, and cattle manure appear to be about equally valuable as manures, though from the appearance of the growing plants peat and peat moss did not seem to be such good manures as cattle dung."

Potassium silicate (ground phonolite) as a potash fertilizer, E. WEIN (*Das Kalisilikat als Kali-Düngemittel. Freising, 1909, pp. 90*).—This pamphlet describes the potassium silicate used, and reports a large series of comparative tests of the silicate and other potash fertilizers on a variety of crops from 1905 to 1908.

The silicate tested in these experiments was finely ground phonolite containing 9.5 per cent potash, 8.1 per cent soda, 1.2 per cent lime, 24 per cent alumina, 50.2 per cent silicic acid, and 0.1 per cent phosphoric acid. The potash was present largely in the form of silicate insoluble in water and from $\frac{1}{3}$ to $\frac{1}{2}$ soluble in hydrochloric acid.

The author concludes from the results of these experiments that the ground phonolite may be used with advantage, particularly in the following cases: For potatoes and garden crops which are injured by fertilizers containing chlorin; on the better quality of heavy soils in alternation with potash salts; on moor soils and very light sandy soils in bad physical condition and on soils deficient in lime; for the creating of a potash reserve in soils poor in this constituent; for the preparation of garden soils and soils for pot experiments; and as a subsoil preparation for fruit plantations.

A new fertilizer—Palmaer phosphate, L. GRANDEAU (*Jour. Agr. Prat., n. ser., 19 (1910), No. 26, pp. 811, 812*).—The method of preparation and the composition and fertilizing value of this phosphate are discussed. The phosphate contains 36 to 38 per cent of phosphoric acid, of which 95 per cent is citrate-soluble.

The Palmaer method of preparing phosphatic fertilizers from low-grade phosphates, EBBINGHAUS (*Chem. Ztg., 34 (1910), No. 66, p. 586; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 12, p. 774*).—In this process apatite and phosphorite are converted into dicalcium phosphate by solution in chloric or perchloric acid generated electrolytically from the sodium salts, the salts being regenerated after the conversion of the phosphates, thus making a continuous process. The method is applicable to phosphates not suited to the manufacture of superphosphate by ordinary methods.

Palmaer phosphate, the latest commercial fertilizer, G. FINGERLING (*Württemb. Wchnbl. Landw., 1910, No. 29, pp. 473, 474*).—The fertilizing value of this dicalcium phosphate prepared by the process referred to above is briefly discussed. On the basis of experiments by Söderbaum it is stated that this phosphate is fully as effective as superphosphate and more effective than Thomas slag. It is further stated that the price is such that it can be profitably employed by farmers.

Fertilizer experiments on moor soils with Palmaer phosphate, H. VON FEILITZEN (*Jour. Landw., 58 (1910), No. 1, pp. 33-43, pls. 5; Deut. Landw. Presse, 37 (1910), Nos. 42, p. 460, figs. 2; 43, pp. 475, 476, figs. 2; abs. in Chem. Zentbl., 1910, II, No. 6, p. 404; Jour. Chem. Soc. [London], 98 (1910), No. 572, II, p. 538*).—In pot experiments with potatoes, cabbage, and lupines, and field

experiments with oats, beans, and vetches, the Palmaer phosphate proved equal to superphosphate and Thomas slag.

The use of lime in Massachusetts agriculture, W. P. BROOKS (*Massachusetts Sta. Circ. 20, pp. 6*).—This circular discusses briefly and in a popular way how to determine what soils need liming, the kind of lime to use, the relation of lime to crops, methods of supplying lime, quantity of lime needed, mixing the lime with the soil, and possible effects of liming.

Note on the occurrence of manganese in soil, and its effect on grass, F. B. GUTHRIE and L. COHEN (*Agr. Gaz. N. S. Wales, 21 (1910), No. 3, pp. 219–222; abs. in Jour. Chem. Soc. [London], 98 (1910), No 571, II, p. 444*).—Examinations of the soil of bare patches which appeared in land which had been seeded to grass for 5 years showed the presence of 0.254 per cent of manganese oxid (Mn_3O_4), while samples from other parts of the area showed no manganese. No other differences in the samples were observed. The injury was apparently greatest in winter when the plants were less vigorous. Failures of barley and wheat from the same cause were also observed. The author is of the opinion that the manganese in the soil is rendered toxic by oxidation.

Fertilizers, 1910, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 213, pp. 29*).—The results of inspection of 161 samples of fertilizers are reported in this bulletin, with the text of the fertilizer law of Canada enacted in 1909 and comments upon the quality of the fertilizers offered for sale in Canada.

Fertilizers (*Off. Yearbook Aust., 3 (1901–1909), pp. 414–417*).—This article contains a brief statement of the main provisions of the various fertilizer laws of the different States of the Commonwealth of Australia and statistics of imports, exports, production, and use of fertilizers in the Commonwealth. The figures show a rapid growth in the demand for fertilizers in recent years.

AGRICULTURAL BOTANY.

Handbook of agricultural bacteriology, F. LÖHNIS (*Handbuch der Landwirtschaftlichen Bakteriologie. Berlin, 1910, pp. XII+907*).—This is an elaborate treatise on the general principles and known facts of modern agricultural bacteriology.

The subject is discussed under 5 general heads as follows: (1) The occurrence and activity of micro-organisms in foodstuffs (pp. 6–97), in which the various changes produced by these organisms in foodstuffs are noted, such as the action of bacteria in the preparation, heating, and firing of hay; their action in silage; the fermentation of starchy, sugary, albuminous, and fatty foodstuffs; their work in digestion; and the influence of foods on the intestinal flora, etc. (2) The occurrence and activity of micro-organisms in the retting of flax and hemp, and in the curing of tobacco (pp. 98–114). (3) The occurrence and activity of bacteria in milk, butter, and cheese (pp. 115–425). (4) The occurrence and activity of bacteria in stable manure (pp. 426–509), including discussions on nitrification, denitrification, ammonification, and the handling of stable manures in the stalls, in heaps, and in the field. (5) The activity of the micro-organisms of the soil (pp. 510–790), including carbon dioxid, methan, and hydrogen formation; the humification of organic matter; the rotting of humus earths; the various conditions of ammonia formation from vegetable débris, stable manure, calcium cyanamid, and from other cyanogen compounds; nitrification; ammonia, amid, and nitrate assimilation; the liberation of free nitrogen by ammonia oxidation and by denitrification; the fixation of free nitrogen by symbiotic and free living micro-organisms; the part that bacteria play in the decomposition of mineral substances, such as phosphates, alkaline carbonates, silicates, iron, and sulphur compounds; and the action of bacteria on the physical condition of the soil, etc.

The author has added much to the value of the text by including on each page footnote annotations and title references to the more important and recent works on the subject under discussion, while a brief statement of the technique and methods to be used in performing cultural experiments under the different groups is appended to each section, accompanied by footnote title references to the more important and extended articles on technique.

The book closes with an index of some 2,600 authors, representing in the aggregate 7,000 titles on subjects relating to agricultural bacteriology, including the results of investigations published during the year 1909 on this subject.

Chilean fungi, C. SPEGAZZINI (*Rev. Facult. Agron. y Vet. La Plata, 2. ser., 6 (1910), pp. 3–205, figs. 133*).—A taxonomic discussion is given of 326 species of Chilean fungi, in which 8 new genera and about 222 new species are described.

Experiments on the latent vitality of the spores of the Mucorineæ and the Ascomycetes, P. BECQUEREL (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 22, pp. 1437–1439*).—The spores of *Mucor mucedo*, *Mucor racemosus*, *Rhizopus niger*, *Sterigmatocystis nigra*, and *Aspergillus glaucus* were slowly dried in small sterilized glass tubes in the presence of baryta anhydrid for 2 weeks at a temperature of 35° C. and then by means of a mercury vacuum pump, a vacuum of less than 0.001 mm. was obtained and the tubes sealed air tight by means of a flame. After remaining in this condition for about 12 months, the tubes were subjected for 3 weeks to the temperature of liquid air (—180°), and then without appreciable warming subjected for 77 hours to the temperature of liquid hydrogen (—253°). About 13 months later, or 25 months from the beginning of the experiments, the tubes were opened with all necessary precautions against outside contamination and the spores sown in liquid sterilized nutritive media.

In about 16 hours the spores of the Mucorineæ germinated and began to produce sporangia. Two days later the spores of Sterigmatocystis and Aspergillus had also germinated and formed mycelia bearing numerous conidiophores.

Studies in soil bacteriology, IV.—The inhibition of nitrification by organic matter, compared in soils and in solutions, F. L. STEVENS, W. A. WITHERS, ET AL. (*Centbl. Bakt. [etc.], 2. Abt., 27 (1910), No. 4–9, pp. 169–186*).—A further study (E. S. R., 22, p. 427) on nitrification is reported in which the inhibiting action of organic matter in solutions and in soils is compared.

The authors claim as a result of their experiments that the inhibiting influence of organic matter (peptone or cotton-seed meal) is much greater in solutions such as Omeliansky's than it is in soil water, and that nitrification can proceed vigorously in the soil in the presence of large quantities of such organic matter as peptone, cotton-seed meal, or cow manure. In the light of these facts the direct application of Winogradsky's conclusions (E. S. R., 11, p. 711) to the field must be abandoned, and with them any practices based on his conclusions, and the activity of these soil bacteria must, in the future, be studied more largely under their natural environments. It is claimed that organic matter even to a large amount, as considered agriculturally, is not necessarily inimical to the functioning of nitrifying organisms in the field.

Some factors concerned in the fixation of nitrogen by Azotobacter, C. HOFFMANN and B. W. HAMMER (*Wisconsin Sta. Research Bul. 12, pp. 155–172, figs. 2; Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 4–5, pp. 127–139*).—A report is made on investigations concerning the source of energy open to nitrogen-fixing organisms, the various conditions that favor or retard their action, the elements other than carbon that are necessary, and the form in which they are most easily utilized by the bacteria.

As a result of these investigations it appears that different soils vary widely in their power to fix atmospheric nitrogen, this ranging from 0.15 to 14.47 mg. of nitrogen per gram of mannit consumed.

Mannit and lactose proved to be the best sugars for maximum fixation in impure cultures. In pure cultures mannit and dextrin yielded the best results, while sucrose gave a high degree of fixation with a pure culture, but only slight fixation in impure cultures.

The efficiency of the Azotobacter as measured by the amount of nitrogen fixed per gram of carbohydrate consumed is much increased in the presence of small amounts of carbohydrates.

Di-calcium and tri-calcium phosphate (in impure cultures, at least) gave better results as regards fixation than the mono-salt. In determining the coefficient of nitrogen fixation of any soil, it is important to consider the period of incubation, as losses in nitrogen will occur if the period is too long, and the determination of the nitrogen content of such cultures will not represent the actual amount fixed. The incubation period for impure cultures was found to range from 14 to 28 days.

The amount of calcium carbonate needed is very small, and appeared to be present in the soil tested in sufficient quantities for the needs of the Azotobacter.

The protein and phosphorus content of the Azotobacter cells is apparently influenced by the age of the cultures, ranging for the protein from 8.31 to 19.18 per cent, and for the phosphorus from 2.51 to 2.97 per cent P_2O_5.

For abundant development in pure cultures in liquid media, and to secure an ample supply for chemical analysis of the dry Azotobacter cells, the new methods previously described (E. S. R., 22, p. 724) were used.

On the influence of humus material in urea decomposition, H. R. CHRISTENSEN (*Centbl. Bakt.* [etc.], *2. Abt., 27 (1910), No. 13–16, pp. 336–362, figs. 2*).—As the result of a large number of experiments, the author claims that the presence of humus or humic acid exerts a very favorable influence on the decomposition of urea.

This disintegration of the urea results in the formation of ammonia, and is brought about by a new species of bacteria (*Urobacillus beijerinckii* n. sp.), which is able to utilize the humus as a source of carbon.

A technical description of the new bacterium is appended.

Effect of previous heating of the soil on the growth of plants and the germination of seeds, F. FLETCHER (*Cairo Sci. Jour., 4 (1910), No. 43, pp. 81–86, pl. 1*).—Previous investigators (E. S. R., 19, p. 1120; 22, p. 121) have claimed that the increased growth in partially sterilized soils was due to the multiplication of ammonia-producing bacteria, but the author states that as their plants were not grown in soils that had been completely sterilized there would appear to be some doubt as to the correctness of their conclusions.

To test this he heated soil to 95° and 170° C., the temperatures being maintained for two hours, after which the water content of all the samples was made equal, and maize, previously germinated, planted in the soils. A decided increase in growth was noted for the partially and completely sterilized soils over the check plants, in length of plumule, general vigor of plant, and average green weight.

The author claims that it is more probable that the effect of sterilization is due to the destruction by heat of toxic substances excreted by plants than to an increased number of bacteria and an increased amount of ammonia.

The effect of heating soil on germination was investigated, a previous investigator having pointed out the retarding effect of heated soil (E. S. R., 20, p. 727). In these experiments the author subjected soil to a temperature of 135° under pressure, after which lupine, Alexandria clover, and sesame seeds were placed in

the soil for germination. The results showed that with the heated soil there was a decided retardation of germination. This is attributed to the fact that the heating of the soil had delayed germination by a decreased rate of imbibition, which in turn was due to the increased osmotic activity of the soil solution caused by the organic matter of the soil being rendered soluble in the process of heating.

On the effects of injuring the cotyledons on the growth of the seedlings, HELENE JACOBI (*Flora, 101 (1910), No. 2, 279–289, figs. 2*).—The results are given of experiments on *Phaseolus multiflorus*, *Cucurbita pepo*, *Picea excelsa*, and *Pinus sylvestris*, in which portions of the cotyledons were removed and the subsequent growth of the plants in fluid and pot cultures in both light and darkness was observed. It was found that a reduction of the reserve food of the cotyledons produced an acceleration of the growth of the seedlings in the earlier stages of their development. The acceleration, however, varied according to the individual plants and the different growth conditions.

On the metabolic changes due to geotropic stimulation, V. GRAFE and K. LINSBAUER (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 118 (1909), I, No. 7, pp. 907–916*).—As the result of experiments with the root tips of *Lupinus albus* and *Vicia faba*, the authors could not ascertain any constant difference in the reducing substance between the stimulated and the nonstimulated roots. The absolute quantity of reducing substances from the root tip was at a minimum and much below the values found by Czapek.

On the excretion of roots, BROCQ-ROUSSEU and E. GAIN (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 24, pp. 1610, 1611*).—As the result of experiments with roots of bean seedlings, the author claims that during the first period of growth peroxidase is excreted by the root hairs, and that the general hypothesis of osmotic excretion by root hairs has been verified experimentally.

Influence of light on the development of fruits and seeds of higher plants, W. LUBIMENKO (*Rev. Gén. Bot., 22 (1910), No. 256, pp. 145–175, figs. 3*).—A study has been made of the effect of confined air within the pericarp of fruits and of light on the development of seeds and fruits of a number of species of plants.

The author determined the amount of carbon dioxid occurring within the pericarp of various leguminous plants. It was found to be less in the light than in darkness, and a confined atmosphere within the pericarp was found necessary to the development of the seed.

In a series of experiments with peas in which very immature pea pods were cut in half lengthwise at right angles to the dorsal suture, the wounds healed readily. The peas when matured were about half the normal size, and instead of being round were lenticular in shape.

In studying the effect of light on the development of seeds and fruits the pericarps of several species of plants were inclosed in paper bags, some of which were double, representing diffused light, while others were black, the light being completely excluded. As in the case of development in confined air, the author found that light was absolutely necessary to the beginning of the development of the fruit. After a brief period of development of the embryo, light was no longer necessary and the development was found to proceed in darkness with a somewhat reduced dry matter in the fruit. The amount of ash seemed to be increased with the diminution of the light. The sugar and free acids in the fruit varied with the different species.

The determination of the optimum intensity of light for plants at different stages of development, R. COMBES (*Ann. Sci. Nat. Bot., 9. ser., 11 (1910), No. 2–4, pp. 75–254, pls. 5, figs. 42; abs. in Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 25, pp. 1701, 1702*).—A study has been made by means of various

kinds of cloth screens of the light requirements of plants with special reference to their optimum at different stages of development, about a dozen species, representing a number of the more common botanical orders, being investigated. The influence of light on water content, fresh and dry weight, photosynthesis, germination, vegetative growth, flowering, fruiting, and ripening have been studied experimentally.

In concluding his observations the author states that strong light in general induces the accumulation of elaborated materials in the storage parts of plants, such as rhizomes, tubers, fruits, etc., while more diffused light tends to the utilization of the nutritive materials and as a consequence increases the growth of such organs as leaves, herbaceous stems, etc.

Observations on the connection between leaf form and light requirement, J. WIESNER (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 117 (1908), I, No. 9–10, pp. 1251–1274, fig. 1*).—The author claims that extensive foliage division, such as small or strongly dissected leaves resulting in small-volumed assimilatory organs, is associated with a high light requirement minimum.

With trees and a large number of other plants which shade a part of their own foliage, the higher the minimum of light requirement the smaller the leaf volume. This small leaf volume usually appears as needle or threadlike foliage, of which the conifers are fine examples. Such finely divided foliage not only secures for the plant the admission of an abundance of diffused light but also secures an advantageous modification of the intensity of the direct rays. On account of the small diameter and large surface of such leaves compared to their volume their heating capacity is low, which is the more advantageous the higher the light requirement.

On the changes produced in direct sunlight when it enters the foliage of trees and other plants, J. WIESNER (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 118 (1909), I, No. 6, pp. 759–812, figs. 11*).—The author gives the results of investigations on the penetration of direct sunlight and of diffused daylight into the foliage of plants through the small spaces between the leaves, the change of intensity, and the transformation of direct sunlight into diffused light within the foliage and tissues of the plants, and on the formation, size, shape, and heat intensity of the sun disks or images formed on the ground in the shade of trees.

Perception of light by plants, A. H. BLAAUW (*Rec. Trav. Bot. Néerland., 5 (1909), No. 2–4, pp. 209–377, pls. 2, figs. 6*).—The author critically reviews the literature of light perception by plants and describes his experiments with oats and *Phycomyces nitens* to determine their phototropic reaction. The phenomena attending such reactions are said to be due to three factors, the primary reaction which light directly exerts upon plants, the counter-reaction, and the power of adaptation to the controlling light influence.

The relation of hairy and cutinized coverings to transpiration, K. M. WIEGAND (*Bot. Gaz., 49 (1910), No. 6, pp. 430–444, fig. 1*).—This is a detailed account of investigations noted elsewhere (E. S. R., 23, p. 130).

Leaf color and chloroplastid formation in evergreen woody plants, V. VOUK (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 117 (1908), I, No. 9–10, pp. 1337–1378, figs. 6*).—It is claimed that the deep green color of the mature leaves of evergreens is due to several factors, of which the most important are the increase in number and size of the chloroplastids followed by an increased chlorophyll production, in which a decrease of xanthophyll in proportion to the chlorophyll present occurs.

The direct absorption of nitrites by plants, F. PERCIABOSCO and V. ROSSO (*Staz. Sper. Agr. Ital., 42 (1909), No. 1–2, pp. 5–36, fig. 1*).—In a series of experiments with different nutritive media it was found that when seedlings

of rice and maize were grown in a sterilized nutrient medium containing dilute sodium nitrite their roots were able to absorb without further oxidation portions of the nitrite present with no injurious effects on the seedlings.

Investigations on the absorption of nitrogenous organic substances by the roots of phanerogams in a carbon dioxid free atmosphere, V. GRAFE (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 118 (1909), I, No. 7, pp. 1135-1153*).—The results are given of experiments on the utilization of nitrogenous organic matter by *Phaseolus vulgaris* when grown in an atmosphere free of carbon dioxid. In these experiments 5 amids, namely, tyrosin, glycocoll, alanin, oxamid, and leucin, were used, both combined into one mixture and singly, as the source of the nitrogenous matter.

It was found that the presence of the amids in no wise compensated for the lack of carbon dioxid. On the contrary, the seedlings died as soon as their reserve food in the cotyledon had been used. Further, the amids produced a poisonous action on the seedlings which showed itself mainly on the root system.

The formation of glucosids by plants, G. CIAMICIAN and C. RAVENNA (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 18 (1909), II, No. 12, pp. 594-596; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 569, II, pp. 234, 235*).—The authors report that not only the maize plant but also a mass of triturated maize is able to decompose salicin and also to transform aromatic substances such as saligenin, catechol, and possibly quinol and mandelonitrile into glucosids.

A study of hydrocyanic acid in Sambucus, C. RAVENNA and M. TONEGUTTI (*Staz. Sper. Agr. Ital., 42 (1909), No. 10-11, pp. 855-879*).—An investigation was made of the hydrocyanic acid in the leaves of *S. nigra*.

It was found that the leaves contained an emulsin capable of decomposing sambunigrin. The enzym is not soluble in water, and all the hydrocyanic acid occurring in the plant is in the form of glucosids, which appear to be more abundant than previously reported (E. S. R., 18, p. 126). The greater proportion of the glucosid is found in the petioles of the leaves. The authors hold that their experiments do not support the theory that the glucosid is formed directly from carbohydrates and nitrates in the leaves, as is the case with sorghum, and they do not believe that the glucosid serves as a reserve material so far as the leaves themselves are concerned.

The simultaneous liberation of oxygen and carbon dioxid during the disappearance of anthocyanin in plants, R. COMBES (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 23, pp. 1532-1534*).—In a previous publication (E. S. R., 23, p. 528) the author has given an account of the rôle of oxygen in the formation and destruction of anthocyanic pigments in plants.

In continuing his experiments studies were made of the gaseous exchanges taking place in red leaves of *Ailanthus glandulosa* taken just as they were losing their red color. Such leaves in the light were found to give off both carbon dioxid and oxygen in appreciable quantities when compared with normal leaves under similar conditions.

This has led the author to conclude that red leaves during this particular period of development suffer a considerable loss of carbon and oxygen, the latter both in the form of carbon dioxid and as free oxygen. Similar phenomena are said to occur in many fleshy plants.

Experiments on the transformation of the starchy and fatty contents of plants, especially of trees, F. WEBER (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 118 (1909), I, No. 7, pp. 967-1031*).—As a result of the author's investigations it is claimed that the processes of fat formation and of starch solution are periodic, but that the former is not, as heretofore supposed, lim-

ited to the fall of the year. The process of starch formation can occur in the branches of fat-storing trees (as Tilia) throughout the entire year, low temperatures acting only as a check on its progress. Fatty trees of the A. Fischer type contain much fat even in the summer and the fat-forming process, at least with Tilia, continues throughout the summer. Only an indirect connection exists between starch solution and fat formation. The contention that fat in comparison with starch represents a more stable form of reserve material and that the fat of trees acts as a protection against cold can not be generally accepted.

The behavior of plants toward lithium salts, C. RAVENNA and M. ZAMORANI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 18 (1909), II, No. 12, pp. 626–630; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 569, II, p. 235*).—The presence of lithium in the ash of tobacco led the authors to investigate the frequent claim that the salts of lithium are poisonous to plants. Tobacco plants were grown in water cultures, one lot receiving a complete nutrient solution, another the same solution to which lithium sulphate was added, and a third a solution in which lithium was substituted for the potassium of the culture medium. The plants grew for about 3 months, when they were cut, weighed, dried, and analyzed, 3 plants from each lot being taken.

The green weight of the check lot was 178 gm., while for the second series, which received the lithium sulphate, the weight was 81.5 gm., and for the third series, where the lithium was substituted for the potassium, the weight was 55 gm. The dry weights for the same lots were 23.6, 15.7, and 7 gm. The ash in proportion to the dry weight increased from the first to the third series. In comparing the amount of lithium in the ash with the lithium present in normal plants, there was found to be a very great increase in the ash of the plants grown in the culture media.

The effect of lithium on potatoes was tested by placing different proportions of lithium sulphate in cavities in the tubers, it being found that for the Solanaceæ lithium did not have a marked injurious effect. For beans and oats grown in sand cultures the lithium salt was decidedly poisonous, but the authors think that perhaps the injury was due to the large quantity of lithium added to the solutions.

The possibility of substituting lithium salts for potassium in the nutrition of plants is to be studied further.

On the poisonous action of alkaloidal solutions on soils and plants, R. OTTO and W. D. KOOPER (*Landw. Jahrb., 39 (1910), No. 3, pp. 397–407, dgm. 1*).—The authors claim as a result of their experiments that both humus and sandy soils will absorb nicotine, but that no true chemical union occurs, and that the alkaloid still retains its chemical properties.

After absorption a part of the nicotine is decomposed, while another portion is volatilized; warmth and dampness hasten these processes, while dryness checks them. It was found that a 3 per cent solution of nicotine increased the alkaloidal contents of *Nicotiana tabacum*, exerting a very favorable influence on its growth and also on the growth of *Solanum tuberosum*.

Other nitrogenous compounds (sodium nitrate) likewise produced an increase in the alkaloidal content, while the addition of alkaloids exerted no appreciable influence on the compounds of other elements.

The effects of factory smoke on pine forests, P. VON RUŠNOV (*Centbl. Gesam. Forstw., 36 (1910), No. 6, pp. 257–268*).—Attention is called to the serious damage to coniferous forests that occurs from factory smoke containing sulphur dioxid and sulphur trioxid, which often kills outright the trees over large areas. The injurious effects of smoke from two cellulose and paper factories, one mineral-oil refinery, and a large factory that burned coal containing sulphur, each situated in separate regions, are noted, and the character and extent of the

injuries, the age and kind of trees affected, and the results of microscopic examinations and chemical analyses of the injured trees are given.

The grasses of Alaska, F. LAMSON-SCRIBNER and E. D. MERRILL (*U. S. Nat. Mus., Contrib. Nat. Herbarium, 13, pt. 3, pp. 47–92+IX, pls. 2*).—This is a systematic treatment, including a key to the tribes and genera, and description of all of the species of grasses which have been properly credited to Alaska. A bibliography of the literature on the grasses of Alaska is appended.

An enumeration of Philippine Leguminosæ, with keys to the genera and species, E. D. MERRILL (*Philippine Jour. Sci., C. Bot., 5 (1910), No. 1, pp. 94*).—This is a taxonomic discussion of 90 genera and 285 species of Leguminosæ, in which 1 genus and 12 species are described as new.

North American Trifoliums, LAURA F. MCDERMOTT (*San Francisco, 1910, pp. 325, figs. 136*).—This key to the genus Trifolium of North America includes "all species native, or introduced and spontaneous, north of the Mexican boundary."

On the wild types of cultivated potatoes, P. BERTHAULT (*Bul. Soc. Nat. Agr. France, 70 (1910), No. 5, pp. 396–404, pls. 6*).—This is a discussion of the various types of wild potatoes, especially of *Solanum commersonii* and *S. maglia*, as the probable ancestors of the commonly cultivated Irish potato.

On the interaction between scion and stock, A. MEYER and E. SCHMIDT (*Flora, 100 (1910), No. 3, pp. 317–397; abs. in Bot. Gaz., 50 (1910), No. 1, p. 73*).—Following an extended discussion of similar investigations by other authors, the results are given of experiments on the formation, movements, and storage of alkaloids, and of the mutual influence between scion and stock, in heteroplastic grafts.

Nicotiana tabacum was used as scion on *N. affinis* and *Solanum tuberosum* as stocks, and *Datura stramonium* as scion on *S. lycopersicum* and *S. tuberosum*. It was found that a slow movement of the alkaloid took place from scion to stock, apparently through the parenchyma rather than through the sieve tubes, and that the stock of *N. affinis*, which is normally poor in nicotine, accumulated many times its normal amount of alkaolid, while the scion *N. tabacum*, normally rich in nicotine, became relatively poor in it.

With *S. tuberosum* as stock for *N. tabacum*, the periderm cells of the former become the main storage tissues of the nicotine, being most abundant in the tissue of the stock just below the graft, and decreasing in amount as the cells became more distant, until in the tuber none at all, or only a trace, appears.

The underground organs of a few weeds, L. H. PAMMEL and ESTELLE D. FOGEL (*Proc. Iowa Acad. Sci., 16 (1909), pp. 31–40, pls. 2, figs. 16*).—A morphological study is reported of the underground parts of some weeds, viz Canada thistle (*Cirsium arvense*), horse nettle (*Solanum carolinense*), milkweed (*Asclepias syriaca*), morning glory (*Convolvulus sepium*), bindweed (*C. arvensis*), and quack grass (*Agropyron repens*), with especial reference to their use as organs of propagation.

Green hemiparasites, E. HEINRICHER (*Jahrb. Wiss. Bot. [Pringsheim], 47 (1910), No. 5, pp. 539–588, pls. 2, figs. 2*).—In continuation of investigations on the parasitic and hemiparasitic Rhinanthaceæ (E. S. R., 14, p. 841), the author gives an account of investigations on respiration and assimilation in Alectorolophus and Melampyrum.

FIELD CROPS.

[Experiments with alfalfa, corn, small grains, and potatoes], L. R. WALDRON and O. GRACE (*North Dakota Sta., Rpt. Dickinson Substa., 1909, pp. 7–38; 59–64; 65, 66*).—Among 68 strains of alfalfa tested, nearly two-thirds had the stand reduced over 80 per cent by winterkilling, while 94 per cent winter-

killed over 40 per cent. The 4 strains that winterkilled less than 40 per cent were Grimm (North Dakota), Grimm (Minnesota), Turkestan (South Dakota), and Mongolian. The yields reported during 1907–8 ranged from 912 to 4,098 lbs. per acre at the first cutting and from 328 to 1,164 lbs. at the second.

After an oat, corn, wheat rotation followed by 3 years of alfalfa, the oat yield was 75.3 bu. per acre or 7.6 bu. above the average yield after winter rye and poor stands of sweet clover and red clover. The oat yield after corn was 74.2 bu. per acre. *Medicago falcata* and *M. ruthenica* proved unpalatable, and also proved inferior to common alfalfa because of low yield, prostrate habit of growth, shattering seed habit, and poor recovery after cutting.

Timothy, slender wheat grass, and brome grass averaged 2,470, 2,950, and 2,520 lbs. of hay per acre during 1908–9. Among oat varieties the highest hay yield of 3,720 lbs. per acre was secured from Beseler No. 1. Among millets, German millet 25092 yielded 6,920 lbs. per acre. Tangier peas, emmer, and field peas yielded 2,816, 2,240, and 1,780 lbs. of hay per acre respectively, while a mixture of oats and barley yielded 2,730 lbs. Among 8 durum wheats in 1909, Kubanka No. 8 and Nicaragua yielded 42.5 and 37.9 bu. per acre respectively as compared with 33.4 bu. from Rysting Fife and 30.9 from No. 299 Blue Stem. During 1906–1909, Durum, Fife, and Blue Stem varieties averaged 27.3, 24.4, and 22.3 bu. per acre respectively. In 1909, Early Mountain, Banner, Victory, Golden Rain, and American Beauty oats yielded from 86.1 to 88.5 bu. per acre in a test of 26 varieties. Of 11 varieties of barley, Hannchen, Swan Neck, and Hanna yielded 48.7, 46.8 and 46 bu. per acre respectively. During 1907–1909, wheat, oats, barley, and emmer averaged 1,871 2,321, 2,011, and 1,893 lbs. of grain per acre respectively. Plats seeded with 3, 5, or 9 pks. of durum wheat during 1907–1909 and common wheat during 1909 produced the highest yields from the heaviest sowing except in 1907 when the lighter sowings produced yields almost twice as high.

In a test of 22 varieties of potatoes Early Bird and Irish Cobbler yielded 334.5 and 331.2 bu. per acre respectively. Prize Winner ruta-baga. Yellow Globe mangel, and Mastodon carrot were the leading varieties, yielding 786, 644, and 435 bu. of roots per acre respectively.

In continuous cropping during 1908–9, oats yielded approximately 46 and 52 bu. per acre respectively after fall and spring plowing, 54, 64, 64 and 68 bu per acre respectively after small grains, green manure, summer fallow, and corn. For wheat the corresponding yields after similar preparation were about 21, 26, 26, 33, 35, and 36 bu. After fall and spring plowing corn yielded approximately 52 and 58 bu. per acre respectively, while after small grains, manure, and summer fallow the yields were approximately 49, 63, and 45 bu. per acre respectively. The plats cropped with small grains, green manured with leguminous and nonleguminous crops, and fallowed in 1907 yielded in 1909 about 48, 52, 49, and 42 bu. respectively.

An individual plant selection of Kubanka wheat yielded 4½ bu. per acre more than its nearest competitor.

Annual report of the Bankipore Agricultural Station for the year 1908–9, F. SMITH (*Ann. Rpt. Bankipore Agr. Sta.* [*India*], *1908–9, pp. 14, pls. 2*).—A brief history of the station and outline of the plan of its work are followed by meteorological data, and an analysis of the station soil and subsoil and of silage from Bankipore. A progress report is given of experimental sowings of a number of field crops and yields are in some instances reported. Flax from Bengal proved longer and coarser than a standard sample of Belgian flax used for comparison.

Annual report of the Burdwan Agricultural Station for the year 1908–9, F. SMITH (*Ann. Rpt. Burdwan Agr. Sta.* [*India*], *1908–9, pp. 23, pls. 2*).—A

brief history and outline of the plan of work of the station are followed by meteorological data and analyses of the soil and subsoil. The highest yield of jute fiber in 1908 followed an application of cow dung and superphosphate, while for the period 1904–1908 the highest yields followed applications of cow dung and castor cake separately. Jute cut when the fruits were entirely ripened invariably produced higher yields of fiber than when cut at any earlier stage. Four years' results show that higher yields of fiber follow a thinning of the crop to 4 in. in the row than thinning to 6, 8, or 10 in. Jute and potatoes in rotation gave good yields.

Annual report of the Cuttack Agricultural Station for the year 1908–9, F. Smith (*Ann. Rpt. Cuttack Agr. Sta.* [*India*], *1908–9, pp. 33+VII, pls. 2*).—During 1905–1908, higher yields of rice followed the application of a mixture of cow manure, superphosphate, and saltpeter than were secured with any other mixture of fertilizers applied, although the highest single yield was secured on a plat green-manuered with dhaincha. The addition of sulphate of magnesia to the fertilizer mixtures applied to rice appeared to produce a 25 per cent increase in the grain yield. The Benaphuli and Badshabhog varieties of rice produced the maximum yields of approximately 37½ maunds (about 3,000 lbs.) each of grain per acre.

Transplanting 1 seedling per hole produced higher yields of grain than did 2, 4, or 8 seedlings per hole. Jute and winter rice or potatoes were successfully grown in rotation during the same year. The highest yield of jute was secured from an application of a mixture of cow dung, superphosphate, kainit, and sulphate of ammonia. The application of different artificial and natural manures produced no apparent difference in color, strength, length, fineness, absence of roots, or value of the jute crop.

Equal yields of potatoes followed applications of castor cake, and of a mixture of cow dung, sulphate of ammonia, superphosphate, and kainit, while the Patna variety produced the highest yields. Khari sugar cane produced a higher yield than the Mungo variety while the local variety failed entirely.

Annual report of the Dumraon Agricultural Station for the year 1908–9, F. Smith (*Ann. Rpt. Dumraon Agr. Sta.* [*India*], *1908–9, pp. 22, pls. 5*).—Meteorological data for the year and an analysis of the station soil are given. The highest profits from sugar cane followed applications of cow dung either with or without castor cake. In 1907, the highest yield of raw sugar was secured from the Khari sugar cane which surpassed all others in hardiness. The trench and Poona methods of cultivating cane gave the highest returns. Cow dung and saltpeter produced higher yields of corn than night soil or the manure alone. The hybrid bansi (Hosangabad) variety produced the highest yield. Farm-pitted manure, a mixture of the solid and liquid substance, produced 1½ times as great a yield of grain and straw as did the same weight of manure left exposed to sun and rain.

Results of experiments: Experimental farm, Potchefstroom, A. Holm (*Transvaal Dept. Agr., Farmers' Bul. 107, pp. 16, pls. 6; Transvaal Agr. Jour., 8 (1910), No. 31, pp. 369–384, pls. 6*).—The rainfall at the station is given by months for the period 1906–1909.

In a test of 28 varieties of corn, Eureka stood first with an average 3-year yield of 5,158 lbs. per acre. Analyses showed that dent was slightly lower than flint corn in moisture, ash, protein, and ether extract, but higher in crude fiber and nitrogen-free extract, while the average of 154 American samples was higher than that of 10 Potchefstroom samples in moisture content, protein, ether extract, and crude fiber, but lower in ash and nitrogen-free extract. During 4 years the results secured by planting 4 varieties of corn at different distances were highest when the rows were 2 ft. apart and 18 lbs. of seed per acre was

planted. A table shows the number of grains per pound for various varieties, and the number of pounds of each variety required to plant an acre at different distances. When planted 12 in. apart in the row, Hickory King produced its maximum amount of silage in rows 1 ft. 6 in. apart, North American at 2 ft. apart, and Natal White Horsetooth at 3 ft. apart. On brown loam the greatest net profit, £2 10 d. per acre, followed an application of superphosphate, while the net loss following the application of nitrate of soda was 18s. 10d.

Cooperative experiments with clovers, vetches, beans, sulla, sainfoin, lupines, and kale (*Agr. Jour. Cape Good Hope, 37 (1910), No. 1, pp. 81–95*).—These pages report briefly tests of kale and a number of legumes on many farms at different points.

[Problems of crop production], H. JUHLIN-DANNFELT (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 3, pp. 228–245*).—These pages discuss modern views as to problems of crop production. The fields of soil bacteriology, soils and fertilizers are reviewed with many references to the literature of the subject.

The rotation of crops for irrigated lands, J. BURTT-DAVY (*Transvaal Dept. Agr., Farmers' Bul. 118, pp. 8*).—Rotations used in England and the United States are given, together with suggestions for the management of rotations in South Africa.

Variety tests in 1909 (*Jahbr. Deut. Landw. Gesell., 25 (1910), No. 1, pp. 37–47*).—Variety tests of wheat, oats, rye, field peas, beets, and sugar beets in different parts of Germany are reported.

The influence of chemical fertilizers on the composition of cereals. RAYNAUD, BRUNERIE, and G. PATUREL (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 26, pp. 777–780*).—These tests were made on wheat, oats, and corn. Each series contained 4 plats—No. 1, the check plat, No. 2, fertilized with 30 kg. of manure, No. 3, fertilized with 500 kg. superphosphate in addition to the manure, and No. 4, fertilized with the same materials mixed with 200 kg. of potassium chlorid. The following table shows the composition of the crops harvested:

Yields and nitrogen and phosphoric acid content of wheat, oats, and corn variously fertilized.

Plat No.	Altkirsch wheat			Early Black Mesdag oats			Yellow Auxonne corn.		
	Weight on a 2-meter square.	Protein.	Phosphoric acid.	Weight on a 2-meter square.	Protein.	Phosphoric acid.	Weight on a 2-meter square.	Protein.	Phosphoric acid.
	Gms.	*Per ct.*	*Per ct.*	*Gms.*	*Per ct.*	*Per ct.*	*Gms.*	*Per ct.*	*Per ct.*
1	393	10.50	0.92	122	8.81	0.82	163	10.5	0.70
2	450	10.75	.99	186	8.50	.78	293	10.0	.75
3	680	10.00	.98	306	8.75	.87	248	10.9	.84
4	792	10.43	1.00	248	8.56	.78	252	12.0	.96

The quality of German oats and rye harvested in 1909 (*Ztschr. Gesam. Getreidew., 2 (1910), No. 5, p. 125*).—A table presents the variation in average moisture percentage, weight per hectoliter, and percentage of weed seed, foreign material, and other grains present in the oats and barley marketed in different parts of Germany.

Seeding mowings, W. P. BROOKS (*Massachusetts Sta. Circ. 27, pp. 8, figs. 3*).—A revision of Circular 16, previously noted (E. S. R., 20, p. 327).

Curing alfalfa hay by steam (*Milling and Grain News, 16 (1910), No. 13, p. 19*).—This article, quoted from the *Kansas City Post* of August 26, states that R. C. Shuey, a student of industrial chemistry at the University of Kansas, has perfected a method whereby a ton of alfalfa can be kiln-cured in about an hour. It then analyzes from 16 to 18 per cent protein and 1 per cent water and when mixed with water exhibits "the same qualities of taste and digestibility as when gathered up behind the sickle."

Fall sowing of barley in 1908–9, N. LITWINOW (*Trudui Byuro Prikl. Bot., 3 (1910), No. 2, pp. 17–40*).—This article states the results of fall sowing of barley with special reference to the snow covering, freezing and thawing, and temperature changes. A table gives a full statement of the meteorological conditions prevailing during the period of the experiment.

Report on barley tests in Franconia, 1907–1909, L. HILTNER and F. LANG (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 8 (1910), No. 6, pp. 67–76*).—These pages report the results of tests of 6 varieties of barley on a number of different farms located at various points. Tables show the yields obtained, weight per hectoliter, milling qualities, and weight per thousand kernels.

Some analyses of Russian brewing barley for protein content, K. V. BENINO (*Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 3, pp. 355–362*).—Considering barleys containing more than 11 per cent protein unsuitable for brewing purposes, the author found that 40.3 per cent of the samples from Bessarabia and 43 per cent of those of Nijni Novgorod and Wjatka were fit for brewing but only 9.1 per cent of those from the south central districts.

Variety tests of forage corn in different provinces, F. G. STEBLER and A. VOLKART (*Landw. Jahrb. Schweiz, 24 (1910), No. 3, pp. 155–171, figs. 4*).—The results of variety tests of American, Hungarian, African, Servian, and other varieties of corn at different points in Switzerland are reported.

Testing seed corn by the cloth roll method, W. MCARTHUR (*Iowa Agr., 10 (1910), No. 6, pp. 226–228, figs. 2*).—The method outlined consists in soaking strips of closely woven muslin 8 in. wide by 4 ft. long, spreading them on a board or table, arranging 6 kernels from each of 40 ears to be tested in rows on the surface of the cloth and rolling the cloth without disarranging the order of the kernels. They are then kept moist by sawdust or otherwise until germination is complete.

Potato culture in Holland (*Dept. Landb., Nijv. en Handel, Verslag. en Meded. Dir. Landb. [Netherlands], 1910, No. 3, pp. XXX+183, pls. 7, map 1*).—This report is a manual of information with regard to the potato industry in Holland. The three parts take up the production of late varieties, production of early varieties, and the potato meal industry, in each of the provinces.

Fertilizers for potatoes, W. P. BROOKS (*Massachusetts Sta. Circ. 26, pp. 4*).—A revision of Circular 14, previously noted (E. S. R., 19, p. 1138).

Negress potato, A. and P. ANDOUARD (*Bul. Sta. Agron. Loire-Inf., 1908–9, pp. 62, 63*).—Other names which the authors give for this potato are Madagascar potato and Cettewayo potato. It is characterized by its low starch content and extreme richness in minerals and proteid material. The small tubers, which are especially notable in these respects, contain 2.69 per cent proteid material, 0.03 per cent lime, 1.01 per cent potassium, 0.23 per cent phosphoric acid and 0.31 per cent of other mineral matter, while the water and starch contents are 70.24 and 2.26 per cent, respectively.

Rye growing in Minnesota, A. BOSS (*Minnesota Sta. Bul. 120, pp. 3–8, figs. 2*).—This bulletin presents statistical data on rye culture, gives directions for the production of rye, and reports the results of variety tests. Among 8 varieties tested during the period 1900–1910, Swedish and Dean produced the highest averages of 38.48 and 37.92 bu. per acre, respectively.

Fertilizer tests of sugar beets in 1909, J. BÉLA (*Kisérlet. Közlem., 13 (1910), No. 1, pp. 104–116*).—At the Magyarovar Plant Growing Experiment Station two series of experiments were conducted on plats of 1,600 square klafters (57,600 square feet) each. In the first series, yields from unfertilized plats were compared with those following applications of 300 kg. of superphosphate per plat, while in the second series, applications of 200 kg. of superphosphate with and without 80 kg. of Chile saltpeter were tested.

The application of 300 kg. superphosphate proved profitable in 44.5 per cent of the tests but showed no constant relation to the sugar content. On 17 out of 37 farms, applications of 200 kg. of superphosphate proved profitable but no profit in any case followed the addition of 80 kg. of Chile saltpeter to the application.

Variety tests of sugar beets in 1909, J. BÉLA (*Kisérlet. Kozlem., 13 (1910), No. 2, pp. 127–178*).—This article gives a full report of the results obtained from each of a large number of varieties of sugar beets tested in 1909.

The beet sugar industry, W. MAXWELL (*Dept. Agr. Victoria Bul. 28, pp. 39, figs. 19*).—The status of the beet sugar industry in the Maffra district is outlined and recommendations made for its improvement. Cultural, manufacturing, and economic processes in California are reviewed and a preliminary report on some Maffra experiments are given.

Studies on climate and crops.—II, The yield of wheat in the United States and in Russia during the years 1891 to 1900, H. ARCTOWSKI (*Bul. Amer. Geogr. Soc., 42 (1910), No. 7, pp. 481–495, figs. 11*).—The author reviews briefly the yield of wheat in the United States and Russia during 1891–1900, noting the variations in yield in each country. He concludes that if variations in harvests during a given year are such that low yields in one country are balanced by excellent ones in another "that the centers of compensation are not always to be observed in the same region," and "that to meet the needs of the international market there may be exceptional yields of insufficient compensation."

A series of maps shows the regions of high and low yields in the United States for the period under discussion From a study of these maps the author notes "a decrease in extent and a displacement in the opposite directions to the hands of a clock" and the same movement on maps of the annual departures of temperature.

Common weeds of the farm and garden, H. C. LONG and J. PERCIVAL (*London, 1910, pp. XVIII+451, figs. 106*).—Weeds are treated in their relations to live stock and farm crops.

A classification of weeds is given, their methods of distribution stated, and preventive and remedial measures outlined. Special chapters are devoted to weeds of arable lands, grass lands, ponds, rivers, ditches, lawns, and drives, and to seed testing. A full bibliography is followed by appendixes containing illustrations of weed seeds, lists of weeds and poisonous plants, a brief summmary of the legislation enforcing the destruction of noxious weeds in each of the chief agricultural countries of the world, and a statement of the value of each of a small number of birds for destroying weed seeds.

Charlock and white radish, G. SCHULTZ (*Arb. Deut. Landw. Gesell., 1909, No. 158, pp. 78, pls. 5, figs. 29*).—This publication deals with the natural history and botany of charlock (*Sinapis arvensis*) and white radish (*Raphanus raphanistrum*). Their methods of dissemination are described and the duration of their vitality discussed. Methods of preventing their appearance are stated and their eradication by various means, including spraying with iron sulphate, discussed.

Quack grass eradication, P. B. CRANE (*St. Paul, Minn., 1910, pp. 114, pls. 2, figs. 21*).—The author discusses quack grass as hay and as a weed and outlines

its eradication by cultivation and by the application of a spray made by mixing 8 lbs. of iron sulphate, 2 lbs. of salt and 2 gal. of sulphuric acid with 40 gal. of water.

Spraying to kill weeds—some useful methods, A. D. SELBY (*Ohio Sta. Circ. 102, pp. 6*).—This circular discusses the spraying of weeds, materials for the purpose, and their application, and similar points.

HORTICULTURE.

[Report of the horticulturist] (*New Mexico Sta. Rpt. 1909, pp. 24–35*).—An outline is given of the year's work with fruits, vegetables, and ornamentals, including some data on a study of the frost resistant qualities of the fruit buds of different varieties of peaches during the spring of 1909 and fertilizer tests with onions in 1907–8. The plan is given of a new pear orchard containing 78 varieties. The newer work includes cultural tests of peaches, grapes, and various vegetables under irrigation on the mesa land.

The observations of the hardiness of peach fruit buds have shown thus far that the freshly opened buds are more cold resistant that the older buds or those which have lost the petals. Many of the freshly opened buds were unharmed even when the mercury dropped to 24° F. for a short period. The chilli experiments which have been conducted for a number of years practically failed in 1908 on account of a wilt disease which appeared in July and August. The trouble is being investigated.

Real facts about the problem of fall planting v. spring planting (*Gard. Mag. [N. Y.], 12 (1910), No. 3, pp. 118–122, figs. 3*).—This is a symposium of actual experiences by expert planters in widely separated sections with the aim of bringing out the comparative merits of fall versus spring planting of trees, shrubs, and herbaceous plants. The numerous practical suggestions given indicate as a whole that special conditions are apt to govern each individual planting operation and that every planter must use his own judgment as to whether he should plant in the spring or fall.

Uniformity of varietal character in garden vegetables, W. W. TRACY (*Trans. Peninsula Hort. Soc. [Del.], 23 (1910), pp. 98–104*).—A discussion of this subject in which the author brings out the great need on the part of the planter of a more complete and accurate knowledge of varietal differences and their adaptation to specific soil conditions, cultural practice, and market requirement; also the desirability of raising stocks of seed which will be more uniform in varietal character.

Celery growing, storing and marketing, H. M. HOWARD (*Mass. Crop Rpt., 23 (1910), No. 4, pp. 30–36*).—A popular article on celery growing, discussing soils, varieties to plant, methods of growing plants, preparation of the soil, cultivating, bleaching, storing, and marketing.

History of fruit growing in Alabama, P. J. BERCKMANS (*Bul. Agr. Dept. [Ala.], No. 36, pp. 103–107*).—A paper on this subject read before the Alabama State Horticultural Society.

[Report on horticulture] (*County Northumb., Ed. Com., Bul. 14, pp. 68–70*).—Descriptive notes are given of the experimental fruit plantation at the Agricultural Experiment Station, Northumberland County, England.

Autumn meeting of the Ohio State Horticultural Society (*Ohio Sta. Circ. 103, pp. 20*).—At this meeting the following papers were presented and discussed: Spraying for the Fungus Diseases of the Apple and Other Crops, by A. D. Selby; Spraying for Insect Foes of the Orchardist, by H. A. Gossard; Apple Growing in Southern Ohio, by U. T. Cox; and A Message from the North,

by W. W. Farnsworth, the last-named paper consisting of practical suggestions relative to various phases of orchard management.

Getting the most in an orchard, H. M. MARTIN (*Gard. Mag.* [*N. Y.*], *12* (*1910*), *No. 3, pp. 116–118, figs. 15*).—Diagrams and tables comparing the hexagonal, square, and quincunx systems of planting are given and discussed. The author concludes that the hexagonal system with very intensive culture is the best one to use in commercial fruit districts where the land is very expensive. The square system, although most wasteful of space, can be used on cheaper lands, or on hillsides where cultivation is difficult.

Establishing the apple orchard, A. T. ERWIN and G. R. BLISS (*Iowa State Col. Agr. Ext. Bul. 5, pp. 27, figs. 10*).—This bulletin treats in detail of the establishment and care of apple trees from planting up to the bearing age. It discusses the orchard site, purchasing nursery stock, planning the orchard, double planting, planting distances, preparation of the ground, planting the orchard, wind-breaks, tillage, cover crops, pruning, injury by animals and insects with protective measures, tax exemption laws, and selection of varieties.

The second season with the peach orchard, M. A. BLAKE (*New Jersey Stas. Bul. 231, pp. 3–41, pls. 16*).—The first season's operations in establishing and managing a peach orchard (E. S. R., 20, p. 1037) is here summarized and the management of the orchard for the second season is discussed in detail, beginning with the treatment of the trees in the dormant period just preceding the beginning of growth. Special emphasis is placed on the correct pruning and training of 1-year-old trees and spraying to control the San José scale and peach leaf curl. Other phases discussed include fertilizing and cultivating the orchard, the control of the peach borer, summer pruning, intercrops and cover crops, and mounding the soil for protection from frost.

Shield-budding the mango, P. J. WESTER (*Palm Beach Weekly News, 17* (*1910*), *No. 9, pp. 1, 4; Rural New Yorker, 69* (*1910*), *No. 4063, p. 861, fig. 1*).—The author describes the methods employed by O. Pound of Cocoanut Grove, Fla., in successfully propagating the mango by means of shield-buds, a practice which has hitherto given rather indifferent results and led to the use of the inarching method as employed by Beach (E. S. R., 18, p. 638), as well as the reversed incision shield-bud method recently employed by Higgins of the Hawaii Station (E. S. R., 22, p. 642). Mr. Pound recently obtained by the shield-budding method over 85 per cent of healthy trees among a lot of 300 plants budded.

Self-sterility of the Scuppernong and other Muscadine grapes, F. C. REIMER and L. R. DETJEN (*North Carolina Sta. Bul. 209, pp. 5–23, figs. 13*).—In a previous bulletin of the station discussing the origin and importance of the Scuppernong and other Muscadine grapes the results of one season's test were given showing that the Scuppernong and Flowers varieties at least were self-sterile (E. S. R., 21, p. 430). The work was continued for 3 seasons and all of the important cultivated Muscadine grapes, including the Scuppernong, Flowers, James, Thomas, and Mish varieties as well as many wild fruiting forms were tested for self-sterility. The work included a large number of bagging experiments, germination tests, microscopical studies of pollen, determination of the proportion of flowers that develop fruit, studies of flower structure, and observations of the influence of male vines in established vineyards. The experiments are discussed in detail.

On summarizing the bagging tests for the cultivated varieties, it was found no fruit developed in 558 out of 568 branches, each containing from 1 to 400 flower clusters which were covered to exclude the foreign pollen. In 8 bags some small seedless and worthless berries were developed and in 2 bags a total

of 2 normal berries and several inferior seedless berries developed. Out of 144 branches covered and later treated with pollen from male vines, 91 bore well developed fruit, many of the branches being heavily loaded.

In the germination tests none of the pollen from any of the cultivated varieties or fruiting wild varieties germinated, although various solutions were used. Pollen from the male or staminate vines germinated vigorously in from 3 to 4 hours, a 30 per cent sugar solution giving the best results.

A microscopical study of the dry pollen of the various fruiting varieties showed that the grains were quite irregular and varied a great deal in shape, appearing like mere shells. On the other hand the male pollen grains were uniformly oblong in shape and plump in appearance.

The stamens of the male vines were very long, upright, and contained a large amount of pollen whereas the stamens of the cultivated and with one exception of the wild fruiting forms were short, recurved or reflexed, and contained much less pollen than those of the male flowers. The exceptional wild fruiting form, the stamens of which resembled the male stamens, was only recently observed and no conclusions have been drawn thus far as to its sterility.

It was found that only a small proportion of the flowers of the cultivated varieties of this species develop into berries. On 1 branch containing 120 flower clusters with from 10 to 50 flowers in a cluster, only 25 clusters developed berries. The number of berries to the cluster varied from 1 to 9. Although as many as 60 flowers have been observed in a cluster of the Scuppernong grape, a careful search of the best vines showed that the largest single cluster found contained only 27 berries. The largest authentically reported yield of this variety is given as 870 bu. per acre.

From observations made, the beneficial influence exerted by male vines located in the vicinity of fruiting vines appears to be thoroughly demonstrated.

The general conclusion drawn from the investigation is that the leading varieties of cultivated Muscadine grapes, as well as practically all of the perfect flowered wild Muscadine grapes are self-sterile. Three of T. V. Munson's hybrids of this species which bloomed at the station proved also to be self-sterile.

The authors point out that since the cultivated varieties of this species are self-sterile, provision should be made for cross-pollinating them. A planting method for the introduction of male vines in fruiting vineyards is suggested and figured. Male vines should be selected which mature their pollen in the blooming period of the fruiting vines. Attention is also called to the importance of bees in carrying pollen as well as the need of suitable soils and proper pruning and thinning.

It is commonly known that Scuppernong seedlings produce dark grapes, whereas the Scuppernong itself is a light colored grape. Both dark and light types of male vines occur, but the light vine is quite rare. During 2 seasons the Scuppernong was fertilized with pollen from a light male vine. The resulting seedlings are light in color, in most cases have pistillate or fruiting flowers, and it is believed that they will produce light colored fruit. The general inference is drawn that Scuppernong seedlings usually produce dark fruit because the dark male vines are much more numerous than the light male vines.

On the preservation of fresh pineapples for shipment from West Africa, D. Bernegau (*Tropenpflanzer, 14 (1910), No. 8, pp. 417–419*).—Some trial shipments of pineapples packed in peat dust were made from Kamerun, West Africa, to Hamburg, Germany, with the result that the fruit arrived in a fair condition of preservation. The author is of the opinion that the packing of pineapples in peat dust may enable shippers to forward fruit on vessels which are not specially provided with cold storage facilities.

Have we enough New England blackberries? E. P. BICKNELL (*Bul. Torrey Bot. Club, 37 (1910), No. 8, pp. 393–403*).—A taxonomic study of the New England blackberries. The author is of the opinion that many of the so-called species are merely hybrids, and lists are given for the purpose of showing their probable hybrid nature.

[Notes on ornamentals and fruits], L. R. WALDRON and O. GRACE (*North Dakota Sta., Rpt. Dickinson Substa., 1909, pp. 64, 65*).—A brief statement of the condition of trees, shrubs, and fruits growing on the substation grounds. Some of the sand cherries bred by Hansen (E. S. R., 20, p. 239) produced good fruit in 1909 and are considered worthy of general cultivation in North Dakota.

Phenological notes: Blooming dates for Iowa plants, 1909, CHARLOTTE M. KING ET AL. (*Trans. Iowa Hort. Soc., 44 (1909), pp. 239–248*).—Records for 1909 are given by a number of observers from different parts of the State, showing the dates of the first blooming of trees, shrubs, and flowering plants.

Narcissus cultivation (*Bd. Agr. and Fisheries [London], Leaflet 224, pp. 10; Bul. Mens. Off. Renseig. Agr. [Paris], 9 (1910), No. 7, pp. 773–781*).—This leaflet is intended as an elementary guide to narcissus culture. It treats in detail of the growth of bulbs for sale as bulbs and of their culture for blooms.

Ornamental shrubs of the United States (hardy, cultivated), A. C. APGAR (*New York and Chicago, 1910, pp. 352, figs. 645*).—This is a popular guide to the identification of the hardy, cultivated ornamental shrubs of the United States.

To meet the needs of the general public practically all plants have been given common names. Introductory remarks deal with the various methods of propagating plants. Part 1 consists of a study of the leaves, flowers, and fruit preparatory to using the keys to the genera given in part 2. In part 3 the various shrubs are figured and described, the plants being arranged by families.

Garden planning, W. S. ROGERS (*London and Leipsic, 1910, pp. 328, figs. 150*).—A practical work on garden design in which the successive chapters discuss the factors in detail, the garden picture, the rectilinear principle, the elements of the garden plan, beds and borders, walks and drives, grass, how to plan a garden, sloping gardens, the rock garden, the rose garden, water in the garden, the vegetable garden, glass, fences and hedges, tile and other edgings, garden accessories, garden plans, planting, further considerations in garden making, and the garden and the flower. The appendixes contain planting tables of various kinds, information relative to manures and composts, garden geometry, tools, and appliances.

Sixth annual report of the Rhode Island Metropolitan Park Commission of Providence plantations (*Ann. Rpt. Bd. Metropol. Park Comrs. [R. I.], 6 (1910), pp. 143, pls. 6, figs. 36, maps 9*).—This report is similar in nature to those of previous years (E. S. R., 22, p. 449). It contains an account of the work to date in developing a park system for the metropolitan district of Rhode Island, including descriptions and maps of areas recently acquired, together with further suggestions and estimates for the development of a complete park system.

FORESTRY.

The American woods, exhibited by actual specimens and with copious explanatory text, XI, R. B. HOUGH (*Lowville, N. Y., 1910, pp. VIII+54, wood sections 75*).—Part 11 like the previous parts, the first one of which appeared in 1888, consists of 25 sets of wood sections representing 25 species. In so far as it has been possible to prepare them the specimens for each species include a transverse, radial, and tangential section. The specimens are accompanied by a systematic description of each species of the woods represented, including its botany, physical properties and the uses of the wood.

Part 10 of this series, issued in 1904, contained a general index to parts 1 to 10 inclusive.

The trees of Great Britain and Ireland, H. J. Elwes and A. Henry (*Edinburgh, 1910, vol. 5, pp. VIII+1001-1333, pls. 70*).—This is the fifth 2-part volume of this extensive treatise on the trees either native to or cultivated in Great Britain and Ireland (E. S. R., 20, p. 1133).

In part 1 the varieties and species of Pinus, Cupressus, and Quercus are considered relative to their botany, distribution and cultivation, as well as the history and economic value of the more important forms. A key is given for each genera and also descriptions of specimen trees growing in Great Britain. Part 2 consists of illustrations and botanical drawings of the trees discussed in part 1.

The forest fertilizer experiments at Tharand, Vater (*Mitt. Deut. Landw. Gesell., 25 (1910), Nos. 35, pp. 513-516; 36, pp. 530-532*).—This consists of a summarized account of the fertilizer experiments in a number of forests which have been conducted cooperatively for a number of years by the soil physics division of the Saxony Experiment Station and the German Agricultural Society. The results as a whole indicate thus far that the cost of the fertilizers has far exceeded the increased returns.

Forests and reservoirs in their relation to stream flow, with particular reference to navigable rivers, H. M. Chittenden (*Trans. Amer. Soc. Civ. Engin., 62 (1909), pp. 245-546, pls. 11, figs. 17*).—Previously noted from another source (E. S. R., 20, p. 945).

Forest fires in North Carolina during 1909, J. S. Holmes (*N. C. Geol. and Econ. Survey Bul. 19, pp. 52, pls. 9*).—This paper embodies the results of an investigation regarding the number of forest fires, the amount of damage resulting from them, their causes, and possibilities of fire prevention. Tabular data showing the forest fires in the mountain region, Piedmont region, and Coastal Plain region of North Carolina are given and analyzed. The causes, prevention, and extinguishing of forest fires are also discussed.

According to reports from 84 counties of the State over 400,000 acres, or 5 per cent of the estimated total area of forest land in North Carolina, were burned over in 1909 with an estimated total loss of $1 to $1.30 per acre.

[Report on forestry] (*County Northumb., Ed. Com., Bul. 14, pp. 66-68*).—The silvicultural plats established at the Agricultural Experiment Station of Northumberland County, England, are briefly described.

Forestry in the Highlands of Scotland, W. Dallimore (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1910, No. 7, pp. 239-248*).—A brief account of afforestation work being conducted on several estates in Scotland.

Reports on the forest administration in Burma for the year 1907-8, J. H. Lace et al. (*Rpts. Forest Admin. Burma, 1907-8, pp. 193*).—This consists of the annual reports of the conservators of state forests in the Pegu, Tenasserim, Northern, and Southern Circles of Burma for the year 1907-8. It discusses alterations in forest areas, the making of working plans, forest surveys, and other routine work, forest protection, silvicultural operations, exploitation, financial results, and administration. The important data are tabulated in a series of appendixes. A review of the reports by the chief conservator of forests in Burma is included.

Report on the forest administration of the Central Provinces for the year 1908-9, A. F. Gradon, A. V. Monro, and F. Trafford (*Rpt. Forest Admin. Cent. Prov. [India], 1908-9, pp. 9+19+19+18+XC*).—Reports similar to the above are given by the respective conservators of the state forests in the Northern, Southern, and Berar Circles of the Central Provinces for the year 1908-9.

Progress report on forest administration in the Punjab for 1908–9, C. P. FISHER (*Rpt. Forest Admin. Punjab, 1908–9, pp. 20+CIII, map 1*).—Data similar to the above are given relative to the administration of the state forests in the Punjab for 1908–9.

Report of the chief forest officer, J. M. PURVES (*Ann. Rpt. Agr. and Forestry Dept. [Nyasaland], 1910, pp. 20–22*).—A brief report on the work of the Nyasaland Forestry Division for the year ended March 31, 1910, with an appendix showing the royalties collected on timber and firewood.

The new Forest Products Laboratory, E. A. START (*Amer. Forestry, 16 (1910), No. 7, pp. 387–403, figs. 13*).—A detailed description is given of the new forest products laboratory of the Forest Service of this Department, located at Madison, Wis. (E. S. R., 23, p. 199).

The work of the Government in forest products, H. S. GRAVES (*Amer. Forestry, 16 (1910), No. 7, pp. 405–408, fig. 1*).—An address on this subject delivered at the opening of the forest products laboratory, Madison, Wis., June 4, 1910.

[Rubber investigations in Nyasaland], J. S. J. MCCALL (*Ann. Rpt. Agr. and Forestry Dept. [Nyasaland], 1910, pp. 8, 9*).—Results are given of experimental tappings of 4-year-old Ceara rubber trees.

The trees were planted 15 by 9 ft. and 12 by 9 ft. From 170 trees having a girth under 12 in. at 3 ft. from the base was obtained 42 oz. of dry rubber, or approximately ¼ oz. each, while 273 trees with a girth over 12 in. gave a total yield of 356 oz., or approximately 1⅓ oz. per tree. The tapping operations continued for 22 days and the rubber was collected at an estimated cost of 8 cts. per pound, exclusive of European supervision.

From the above experiment and other experiments conducted in the same region the conclusion is reached that 3 oz. of dry rubber per tree will be a good average yield for trees over 4 years old. In some experiments conducted in Zomba the vertical and pricking tapping systems cost 25 cts. and 31 cts. per pound, respectively, for dry rubber collected. The flow of latex from cultivated Ceara trees was quite superior to that from uncultivated Ceara trees.

Experimental tapping of Para rubber trees in the Botanic Gardens, Singapore, for the year 1909, H. N. RIDLEY (*Agr. Bul. Straits and Fed. Malay States, 9 (1910), No. 7, pp. 237–255*).—This consists of a tabulated summary showing the progress made in the various tapping experiments during 1909.

The trials of different methods of tapping indicate that the single herringbone method is the most satisfactory, with basal excisions second. Tapping on alternate days showed an advantage of nearly 4 per cent over tapping daily. It was found that there is not only a variation in the quantity of latex obtained at the different seasons and in different years but also a variation in the composition of the latex itself from day to day. During 21 tappings almost daily from the same group of trees, the volume of latex varied from 114 to 338 fluid ounces, while the weight of a sheet of rubber prepared daily from 30 fluid ounces of the latex varied from 6 to 8¾ oz. (avoirdupois).

Where other conditions are normal, the variation in rainfall is believed to be the important factor, bringing about variations in the composition of the latex. The results of one year's tapping show that the quantity of latex required to produce 1 oz. of dry rubber, including some added water to retard rapid coagulation, varies from 2¾ fluid ounces in April and May to 8¾ fluid ounces in February and March. These 2 latter months, however, represented the principal resting season between 1908 and 1909.

Notes on the cultivation of Para rubber (Hevea brasiliensis) and the yield of rubber, H. N. RIDLEY (*Agr. Bul. Straits and Fed. Malay States, 9*

(1910), No. 7, pp. 256–276).—Notes are given on some cultural experiments of Para rubber trees in the Singapore Botanic Gardens, consisting of data on the yields of rubber from large and small trees, together with tables showing the increment of growth during a 6-year period of a large number of trees as influenced by wide planting and by close planting.

The difference in the quantity of latex between young and old trees of nearly the same aggregate girth is not very large, although variable. The ratio of rubber to the volume of latex between young and old trees is considerably higher in old trees. The necessity of wide planting as the most important factor in the annual increment of growth of rubber trees is pointed out. The increment of growth of Para trees is variable according to situation, soil, and humidity, and the ratio of increment also varies according to the age of the tree. In general it is stated that the average increment should not be less than 2 in. per year between the third and thirtieth years.

Notes on the experiments of coagulating and curing rubber, H. N. Ridley (*Agr. Bul. Straits and Fed. Malay States, 9 (1910), No. 7, pp. 277–284*).—Several experiments were made at the Singapore Botanic Gardens in curing latex by smoking as is done in Brazil, the aim being to test whether the coagulated latex from plantation trees would be improved or deteriorated by such process. Samples of smoked rubber were submitted to the Imperial Institute and to commercial works for appraisement.

The general results indicate that the rubber prepared by smoking is only a little below fine, hard cured Para, and the author is of the opinion that the keeping qualities of the plantation rubbers in the crude state will be improved by creosoting or smoking. The difference in the physical texture and appearance of rubber from young or old trees coagulated with such reagents as acetic acid is scarcely perceptible, whereas under the smoking process the superior strength and elasticity of the resulting rubber from old trees is manifest.

Bleeding Hevea rubber trees by the Northway system, M. T. Petch (*Jour. Agr. Trop., 10 (1910), No. 109, pp. 193–196, figs. 4*).—The Northway system of tapping trees, which consists of the use of a pricker instead of a knife, is described in detail and the objections of a physiological and practical nature accompanying the use of the pricker are discussed.

The general conclusion is reached that the incision method of tapping, as with the pricker, has after wide experimenting proved inferior to the excision method of tapping, as with different forms of tapping knives. Not only were the returns inferior where the pricker was used but the cost of harvesting was increased and more damage done to the trees. Moreover, the pricker is only adapted for use on young trees, the quantity of latex from which is too small to justify their tapping.

Annual report on the literature and important happenings in the realm of scientific forestry, forest zoology, agricultural chemistry, meteorology, and forest botany for the year 1909, H. Weber (*Allg. Forst u. Jagd Ztg., 1910, Sup., pp. 102*).—As in previous years (E. S. R., 21, p. 445), this supplement contains abstracts of the important literature on the various phases of forestry, together with notes on important occurrences in the forest world for the year 1909. The topics included are silviculture, utilization, management, valuation and statics, the theory of forest mensuration and yields, administration, history, policy, statistics, news of forest unions and hunting clubs, zoology, botany, and soil physics.

DISEASES OF PLANTS.

Annual report on plant diseases, M. HOLLRUNG (*Jahresber. Pflanzenkrank., 11 (1908), pp. VII+362*).—This report, published in 1910, is a review of the literature which appeared in 1908 relating to plant diseases and insect pests, and methods for their control.

Of the 1,373 titles noted, over 600 are abstracted at some length. The general arrangement and treatment of the topics are similar to those in previous reports (E. S. R., 21, p. 640).

Notes on fungus diseases of plants, L. H. PAMMEL and CHARLOTTE M. KING (*Proc. Iowa Acad. Sci., 16 (1909), pp. 41–97, charts 39*).—The authors discuss the nature of disease, factors of environment in plant disease, fungi as the cause of disease, soil moisture and fungus diseases, weather and fungus diseases, some epidemics of fungus diseases (mildews, rusts, downy mildew, etc.), immunity to disease, and biologic species.

The article closes with tables showing the comparative distribution of the common fungus diseases in Iowa from 1870 to 1908, inclusive, the comparative distribution over the United States of the common fungus diseases from 1900 to 1907, inclusive, charts showing the annual precipitation and mean surface temperatures from 1900 to 1907 throughout the United States, and the areas affected by potato rot, powdery mildew of the cherry, ash rust and apple rust in 1884, wheat and grain rust in 1904, and potato rot in 1903 and 1906.

Annual report of the mycologist, J. B. RORER (*Bd. Agr. Trinidad, Ann. Rpt. Mycol., 1910, pp. 8*).—A general report is made on the diseases of cacao, sugar cane, coconut palm, bananas, and other crops. Diseases of cacao were found to be responsible for the greatest losses, and were given special attention. Preliminary studies of tree canker and pod rot are reported, and a more detailed account of this work is abstracted on page 748 of this issue.

Mycological notes, F. VON HÖHNEL (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 118 (1909), I, No. 6, pp. 813–904, figs. 3*).—In a taxonomic discussion of many parasitic genera and species, some of which are described as new, the author gives the characteristics of *Phyllachora sorghi* n. sp. on *Sorghum vulgare* from Java, and *Micropeltella quercus* n. g. and sp. and *Japonia quercus* n. g. and sp. on the leaves of *Quercus glauca* from Japan.

Parasitic plants observed in Torino and vicinity during 1909, P. VOGLINO (*Ann. R. Accad. Agr. Torino, 52 (1909), pp. 277–306*).—A list is given of about 60 species of bacteria and fungi parasitic on forest, orchard, field, garden, and wild plants, together with the characteristics of several of the more important, including *Sclerotinia ocymi* n. sp., *Botrytis parasitica colchici*, *B. cinerea dianthi*, *Cenangium populneum* or the ascogenous form of *Dothichiza populea*, and the probable reference of the oak Oïdium to *Oïdium ventricosum*.

Of the parasites listed there are 3 species of bacteria, 6 of Phycomycetes, 17 of Ascomycetes, 6 of Basidiomycetes, and 27 of imperfect fungi.

Mycological review for the year 1908 with notes on the fungus diseases of alfalfa, G. BRIOSI (*Bol. Min. Agr., Indus. e Com. [Rome], 9 (1910), Ser. C, No. 2, pp. 4–14; abs. in Riv. Patol. Veg., 4 (1910), No. 9–10, pp. 130, 131*).—Preceding a general statement of the number of fungi examined and identified at the botanical station at Pavia, is a discussion of diseases of alfalfa in which the following are noted: Powdery mildew (*Peronospora trifoliorum*), rust (*Uromyces striatus*), smut (*Tilletia glomerulata*), downy mildew (*Erysiphe polygoni*), leaf spot (*Pleosphærulina briosiana* and *Pseudopeziza medicaginis*), canker (*Sclerotinia trifoliorum*, *Mitrula sclerotiorum*, *Typhula trifolii*, and *Vibrissea sclerotiorum*), anthracnose (*Colletotrichum trifolii*), bacteriosis, leaf diseases (*Phyllosticta medicaginis*, *Ascochyta medicaginis*, *Septoria medicaginis*,

Glœosporium morinum, Marsonia medicaginis, Ovularia medicaginis, and *Alternaria tenuis*), root canker (*Rhizoctonia violacea*), club root (*Urophlyctis alfalfæ*), *Orobanche rubeus*, and Cuscuta.

Plant-like Actinomycetes, J. Peklo (*Centbl. Bakt.* [*etc.*], *2. Abt., 27 (1910), No. 17–21, pp. 451–579, figs. 163*).—The author gives an extended discussion of the taxonomic position of the organisms inhabiting the root tubercles of *Alnus glutinosa* and *Myrica gale*, in which their morphological characteristics and general nature are compared with those micro-organisms found in other tubercles (root tubercles of legumes, tuberculosis tubercles, etc.). The conclusion is drawn that these tubercle bacteria belong to the genus Actinomyces.

A serious disease of plants in Para, C. F. Baker (*Amer. Rev. Trop. Agr., 1 (1910), No. 3–4, pp. 99–101*).—Attention is called to a very serious and widely disseminated disease due to nematodes (Heterodera), which makes impossible the cultivation of tomatoes, cabbage, radishes, turnips, tobacco, cotton, etc., on old lands about Para.

Crop rotation with nonsusceptible plants, clean culture, and the removal and burning after each harvest of all remaining roots, are suggested.

Nematode control by trap plants, A. Postelt (*Wiener Landw. Ztg., 60 (1910), No. 9, pp. 79, 80*).—In experiments on the control of nematodes infesting sugar-beet lands, several crops of rape and turnips were used as trap plants, resulting in a marked decrease in nematode injuries on land thus treated.

On the ergot of wild and cultivated grasses, B. Barnas (*Math. u. Naturw. Ber. Ungarn, 24 (1906)* [*pub. 1909*], *p. 377; abs. in Riv. Patol. Veg., 4 (1910), No. 9–10, p. 132*).—The sclerotia of ergot (*Claviceps purpurea*) is reported on *Hordeum nudum, Lolium temulentum, Triticum caninum, Agropyrum barbulatum*, and *Aira flexuosa*, which with those heretofore reported make 35 hosts known for this fungus. It is claimed that the infection of cultivated grasses does not occur usually from ascospores, but more probably from conidia found in the so-called honeydew, as the inoculation of *T. repens, Dactylis glomerata*, and *Bromus inermis* was successful with these spores from cultivated plants.

On the dissemination and appearance of the root fungus of alfalfa (Rhizoctonia violacea) in Franconia, G. Lauber (*Illus. Landw. Ztg., 30 (1910), No. 46, pp. 439–441, figs. 5*).—A general discussion is given of the characteristics and prevalence of this disease, together with the results obtained from experiments in combating it in which carbon bisulphid, creosol, liquid manure, quicklime, and copper sulphate were used. The liquid manure, creosol, and quicklime proved of value in controlling the disease.

On the formation of bacterial zooglœa on the roots of barley, H. Zikes (*Ztschr. Gesam. Brauw., 33 (1910), No. 29, pp. 357–360*).—Attention is called to the formation on the roots of barley in breeding experiments of a yellow, or more rarely, a red zooglœa mass, consisting, for the yellow, of 3 species of bacteria, viz, *Bacterium fluorescens liquefaciens, B. herbicola aureum*, and *B. rubrum*, and for the red, of *B. herbicola rubrum*.

It was found that these zooglœa on the roots check the growth of the barley seedlings.

Smut infection experiments with reference to breeding smut-resistant varieties of barley, J. Broili (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 7, pp. 335–344, figs. 7*).—The author gives the result of infection experiments with covered barley smut (*Ustilago hordei tecta*) and loose barley smut (*Ustilago hordei nuda*) on various varieties of barley.

The conclusion is drawn that for the loose barley smut the breeding of resistant varieties will be comparatively easy, but that for the covered smut it will be more difficult on account of unknown factors, such as wintering and time of planting, complicating the matter.

Some experiments with fungicides used for the prevention of stinking smut (bunt), G. L. SUTTON and R. G. DOWNING (*Agr. Gaz. N. S. Wales, 21 (1910), No. 5, pp. 382–397; abs. in Jour. Dept. Agr. So. Aust., 13 (1910), No. 11, pp. 960–965; Gard. Chron., 3. ser., 48 (1910), No. 1228, p. 22*).—The results are reported of further experiments (E. S. R., 18, p. 1140) at the Cowra Experiment Farm during 1909 on the stinking smut of wheat, in which a ¼ per cent solution of formalin, a 2 per cent solution of copper sulphate, a 2 per cent solution of copper sulphate supplemented by immersion in limewater, Bordeaux mixture, a 2 per cent solution of copper sulphate to which was added sufficient salt to make a saturated solution, a saturated solution of salt and water, and Fungusine, a trade compound, were used.

The copper sulphate proved a splendid preventive of smut and was also satisfactory in preventing re-infection, but it seriously injured the vitality of the seed unless some ameliorating agent was used with it, such as lime or salt. Copper sulphate and lime was not as satisfactory as copper sulphate alone against the bunt, but its destructive effects on the vitality of the seed were much less. It proved advantageous to delay the treatment with limewater, rather than to treat the seed immediately after the copper sulphate soaking.

Copper sulphate and salt proved the most effective preventive of bunt this season. It was better than lime in lessening the destructive action of copper sulphate on the vitality of the grain, and was the most efficient preventive of re-infection. The solution suggested is made of equal parts of copper sulphate and salt.

Fungusine as a smut preventive was not quite so good as copper sulphate alone, but was better than copper sulphate and lime, and has absolutely no injurious effect on the vitality of the grain.

Bordeaux mixture, formalin, and salt water proved unsatisfactory as bunt preventives during the season's tests.

The effect of formalin on the vitality of seed grain, R. STEWART and J. STEPHENS (*Utah Sta. Bul. 108, pp. 145–156*).—Since the publication of Bulletin 84 on the grain smuts (E. S. R., 16, p. 63), in which the use of formalin as a seed disinfectant was recommended, many complaints from growers have been received stating that its use seriously injured the germinating power of the treated seed, that it did not destroy the smut spores, that the treated seed spoiled if not planted immediately, and that the formalin sold in the State was not up to standard and tended to lose its strength.

The work reported in this present bulletin was undertaken for the purpose of throwing light on these questions, and the conclusions reached are as follows: (1) The formalin treatment is effective in preventing the loose and covered smuts of oats, the covered smut of barley, and the bunt of wheat. (2) As dilute a solution as 1 lb. of formalin to 60 gal. of water reduces somewhat the vitality of the seeds of wheat, barley, and oats, the last-named proving more resistant to its injurious influence than the other two. (3) The best strength of solution for use is 1 lb. of formalin (40 per cent) to 50 gal. of water. The seed may be immersed in this for 1 hour without appreciable injury, and if thoroughly dried, will safely keep for at least 6 weeks after treatment.

The club root of cabbage and nematodes, G. T. GRIGNAN (*Rev. Hort. [Paris], 82 (1910), No. 13, p. 301*).—In reply to a communication by Marchand (E. S. R., 23, p. 647) claiming that other plants than the Cruciferæ had been found parasitized by *Plasmodiophora brassicæ*, the author states that a subsequent examination of these plants showed that the malformation on the roots was caused by nematodes (*Heterodera radicicola*).

Root rots of ginseng, W. H. RANKIN (*Spec. Crops, n. ser., 9 (1910), No. 94, pp. 349–360, figs. 14*).—The author has brought together the available informa-

tion regarding some of the more common root rots of ginseng, those described being the wilt (*Acrostalagmus panax*), black rot (*Sclerotinia* sp.), end or fiber rot (*Thielavia basicola*), soft rot (*Bacterium* sp. and *Fusarium* sp.), end or red rot (*Bacillus araliavorus*), crown rot (*Sclerotinia libertiana*), damping off (*Rhizoctonia* sp.), and nematode galls.

The control of onion smut, G. E. STONE (*Massachusetts Sta. Circ. 21, pp. 2, figs. 2*).—In experiments on controlling the onion smut, positive results were obtained by applying per acre 100 lbs. of sulphur thoroughly mixed with 50 lbs. of air-slaked lime in the drills. Ground lime drilled in with a fertilizer drill at the rate of 75 to 100 bu. per acre is also good, but the best results were obtained by the use of either 1 lb. of formalin to 30 gal. of water, or 1 oz. to 1 gal. of water, applied when the seeds are sown with an appliance previously noted (E. S. R., 22, p. 244).

Disease resistance of potatoes, W. STUART (*Ann. Rpt. Comr. Agr. Vt., 1 (1909), pp. 103–109*).—In a general discussion of the results of investigations and experiments with a number of European varieties of potatoes imported in 1905, it is claimed that the characteristics which seem to be associated with the more strongly marked disease-resistant varieties are an erect habit of growth, a stiff, upright, and woody stem, and, in most cases, hairy leaves.

Investigations on the leaf-roll disease of the potato, G. BOHUTINSKY-KRIŽEVCI (*Monatsh. Landw., 2 (1909), p. 118; abs. in Centbl. Bakt.* [etc.], *2. Abt., 24 (1909), No. 23–25, pp. 575, 576*).—From experiments and observations on this disease, the author reaches the following conclusions: (1) The rotting of the stems of the potato plants is a secondary phenomenon; (2) the disease originates from injuries to the roots caused by the attacks of a fungus, whether aided in its entrance by a weakened condition of the plants, or by weather conditions which cause an intensive growth of the fungus in the soil, being as yet undetermined; (3) the fungus usually attacks, at first, solitary plants, and then spreads from these until many plants become diseased.

Enzymatic disturbances of the seed tubers, which show themselves in a curling of the leaves of potatoes grown from them, were not observed. The seed tubers of most leaf-roll diseased plants are usually sound, even when the diseased plants produced from them have died down.

The injuries produced by the fungus cause the death and subsequent rotting of the roots of the plants, while the decomposition products are transported by the fibrovascular bundles to the stems, stolons, and tubers, producing a brown discoloration of the vascular regions in these parts.

The disease has appeared suddenly in different localities in Croatia and Slavonia where previously it had not been observed. It attacks plants grown from seed as well as those propagated from tubers, and completes its development from the infectious stage to the complete destruction of the plants in a single year.

The disease can probably be carried over from year to year by means of the mechanical adhesion of the spores of the fungus to the surface of the tubers, and also by the remnants of infected stolons which cling to the seed potatoes. In either case, disinfection of the seed tubers would be of value in controlling the disease, although, as would be expected, the fungus found in the soil itself would reinfect the disinfected seed under conditions favorable to its growth.

On the history of the leaf curl or ring disease of the potato, C. HUGUES (*Agr. Goriziano, 9 (1910), No. 13, pp. 1, 2*).—From a study of the literature on this subject, the author claims that the leaf curl or ring disease of the potato is not a recently introduced disease, as some authors claim, but that as far back as 1780 there was a serious epidemic, especially in Germany.

On the potato disease caused by Chrysophlyctis endobiotica, E. ZIMMERMANN (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 6, pp. 320–327, figs. 2*).—The history, taxonomic position, dissemination, characteristics of, and methods of control for this fungus are given.

On a bacterial disease of the fibrovascular bundles of the Irish potato, A. SPIECKERMANN (*Centbl. Bakt. [etc.], 2. Abt., 27 (1910), No. 4–9, pp. 205–208*).—An account is given of the isolation, inoculation experiments, and cultural characteristics of certain bacteria found in the fibrovascular bundles of the Irish potato when attacked by a bacterial ring disease which causes a brown discoloration of the fibrovascular bundles.

Experiments on the control of potato scab, BERNHARD (*Deut. Landw. Presse, 37 (1910), No. 18, pp. 204, 205*).—The results are given of experiments on the use of sulphur in combating the potato scab, in which 20 kg. of sulphur per ¼ acre was put on the soil. On the plats treated with sulphur the potatoes were less attacked with scab than on untreated land, but the yield was diminished on account of the dry season.

It is claimed that the sulphur disinfects the soil, puts it in a better physical condition, causes a quicker and more intensive action of the commercial fertilizers applied, makes more available the foodstuffs already present in the soil, and plays a greater rôle in plant nourishment than has been hitherto ascribed to it.

Carbolic acid and black scab disease, F. KITLEY (*Gard. Chron., 3. ser., 46 (1909), No. 1175, p. 362*).—It is suggested that if land is treated with a solution of 3 oz. carbolic acid to 4 gal. water before planting, and with 1 teaspoonful carbolic acid to 4 gal. water after planting, the black scab of the potato will be controlled, as this remedy was found effective with certain diseases of the tomato.

Experiments with potato diseases, 1909–10, G. SEYMOUR (*Jour. Dept. Agr. Victoria, 8 (1910), No. 6, pp. 360–364, figs. 7*).—The author gives the beneficial results of treating seed potatoes with 1 lb. of formalin to 40 gal. of water for 2 hours before planting as a preventive against a form of scab which is causing serious loss (⅓ of the crop in some instances) to potato growers. This scab is presumed to be caused by the potato nematode.

Testing potato varieties for late blight, D. MCALPINE (*Jour. Dept. Agr. Victoria, 8 (1910), No. 6, pp. 358, 359*).—Attention is called to a method of testing under strict quarantine conditions any new variety of potato from a region infected with late blight, by subjecting the tubers for 4 hours to a temperature of from 120° to 122° F., and then growing the treated potatoes in quarantine area for two years.

The heating destroys the mycelium of the fungus in the potato, and at the same time causes the treated tubers to sprout sooner.

Trials with Bordeaux mixtures as a preventive of the late blight of the potato, F. K. RAVN (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 2, pp. 271–292*).—After summarizing the results of experiments with Bordeaux mixture for late blight (*Phytophthora infestans*) conducted in Europe and America, the author reports the results of further experiments with this spray extending over several years and with several varieties of potatoes in which the usual beneficial effects were obtained.

Experiments with Bordeaux mixture in combating potato blight during 1909, M. L. MORTENSEN (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 2, pp. 293–305*).—In spraying experiments with Bordeaux mixture for late blight (*Phytophthora infestans*), the best results were obtained with 2 sprayings (about July 20 and August 20), which increased the average yield of tubers 80 to 90 cwt. per töndeland (1.38 acres), the percentage of dry matter 1 per cent, and the average weight of the tubers about 12 per cent when compared with the unsprayed plats.

From 1,650 to 2,200 lbs. of Bordeaux mixture per töndeland is recommended, according to the size of the tops.

Experiments on the control of sugar-beet diseases, R. SCHANDER (*Deut. Zuckerindus., 35 (1910), No. 5, pp. 110–113; abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 27 (1910), No. 10–12, pp. 307, 308*).—A report is made on experiments carried on during the summer of 1909 in the division of plant diseases of the Kaiser Wilhelm Institute at Bromberg for the control of sugar-beet diseases.

Experiments on soaking and hulling the seed for root diseases showed that hulled seed produced a better and quicker germination, a more thrifty growth, and a smaller percentage of diseased plants than the unhulled seed. The hulling had no influence, however, on the heart or dry rot. Experiments with common salt (NaCl) also gave no beneficial results in controlling the heart or dry rot.

The results of different kinds of nitrogenous fertilizers on the outbreaks of these diseases were tested. It was found that lime nitrogen and ammonium sulphate gave the smallest number of diseased plants, while sodium nitrate and calcium nitrate gave the greatest number.

Results from spraying experiments, 1909, in Pike County, L. E. FOGLESONG (*Trans. Ill. Hort. Soc., n. ser., 43 (1909), pp. 365–371*).—The spraying experiments conducted were to test the relative efficiency of various commercial and homemade formulas in controlling insects and fungus diseases, especially the scab, curculio, and codling moth.

The sprays tested were arsenate of lead, Paris green, Bordeaux mixture, and commercial and self-boiled lime sulphur. The arsenate of lead sprays gave better results, either alone or when used in combination with a fungicide, than Paris green. The self-boiled lime sulphur showed practically no fungicidal or insecticidal value, while Bordeaux mixture gave good results against the scab when from two to three applications were made.

Treatment for prevention of anthracnose, M. O. LOWNSDALE (*Better Fruit, 5 (1910), No. 1, pp. 44–46*). Following a general discussion of the germination and infection periods of anthracnose, or apple canker, and the value of spraying as a preventive of this disease, the author gives his views on the methods of treating the old apple orchards of the Willamette Valley, in which he recommends the removal in January or February of a very thin shaving of bark over the diseased area, leaving only the rotting tissues of the bark intact so that new fiber will grow from underneath

Spraying with 1 gal. of lime sulphur to 16 or 18 gal. of water in September proved remarkably successful in preventing new infection during the succeeding year.

Brown rot and plum curculio on peaches, W. M. SCOTT and A. L. QUAINTANCE (*Better Fruit, 5 (1910), No. 1, pp. 19–22, figs. 13*).—This is a popular discussion of these two very serious pests of the peach, in which the results of spraying with self-boiled lime-sulphur mixtures are given.

For the Elberta, Bell, and other varieties of peaches of about the same ripening period the following is recommended: The first application should be made about the time the calyces are shedding, spraying with arsenate of lead at the rate of 2 lbs. to 50 gal. of self-boiled lime-sulphur mixture; or, the lime sulphur may often be omitted during a dry spring, in which case to each 50 gal. of water, milk-of-lime made from slaking from 2 to 3 lbs. of good stone lime should be added to prevent any caustic action of the arsenate of lead. A second application should be made 2 or 3 weeks later, or about 1 month after the petals fall, spraying with an 8 : 8 : 50 self-boiled lime-sulphur mixture and 2 lbs. of arsenate of lead. A third application should be made about 1 month before the fruit ripens, spraying with an 8 : 8 : 50 self-boiled lime-sulphur mixture.

Methods used in fighting the peach yellows, E. HUTCHINS (*Better Fruit, 5 (1910), No. 1, pp. 64, 65*).—The results are given of a systematic weekly uprooting, cutting, and burning during three years of all trees showing evidence of yellows, at the end of which time the disease was practically eradicated, and the remainder of the trees were sound and vigorous.

The mildew of the grape, L. BOTTINI (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 26, pp. 780–783*).—In a study of the internal causes that produce a difference of resistance in certain varieties of grapes to the attacks of Peronospora, it was found that the leaves of a susceptible variety, when immersed for 1 hour in the juice from a highly resistant variety and then inoculated with the spores of Peronospora, were more resistant to the fungus than untreated leaves. From this the author concludes that the juice or sap of the highly resistant varieties is the cause of their greater immunity to the attacks of the fungus.

An efficient spray against the grape mildew, V. VERMOREL and E. DANTONY (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 30, pp. 101, 102; abs. in Rev. Vit., 34 (1910), No. 866, p. 71*).—It is claimed that a spray composed of 100 liters of water, 20 gm. of nitrate of silver, and 300 gm. of white soap has proved very valuable in combating this fungus, being much superior to the copper sprays used for comparison at the same time and with the same number of applications.

To prepare the spray, first dissolve the 20 gm. of nitrate of silver in 1 liter of water and the 300 gm. of white soap (in powdered form) in a few liters of hot water, then pour the soap solution into 100 liters of water, and lastly, add the silver nitrate solution and stir.

The Oïdium and a modified lime-sulphur spray, V. THIÉBAUT (*Rev. Vit., 33 (1910), No. 862, pp. 691, 692*).—The author states that since 1900 he has used with complete success a modified lime-sulphur spray on his vineyard of some 30,000 plants containing more than 600 varieties, some of which are very susceptible to the Oïdium, and that since 1906 two treatments per season have completely protected the foliage against this fungus. On some of the most susceptible varieties of grapes, however, the fruit has been attacked, to prevent which a supplementary treatment of the inflorescence with lime sulphur alone at the time of flowering has been used.

To prepare the spray, slake one part by weight of good quicklime to a paste, and while still hot add two parts by weight of sublimed sulphur, stirring thoroughly and rapidly with a wooden paddle until the mixture is sufficiently cool to bear one's hand in it. Then add water little by little, stirring energetically, until a semiliquid, homogeneous, citron-colored paste is produced, which thickens when cold, and, if covered up and stored in a cool place, will keep for a long time. Now dissolve in water an amount of copper sulphate equal to the weight of the sulphur used in the lime-sulphur paste, and add the lime-sulphur paste to the sulphate solution, stirring vigorously until the resulting mixture is neutralized, as shown by phenolphthalein paper. If properly done, the result will be a very homogeneous mixture, which will not deposit sediment either in the containing vessel or on the sprayer.

The first application should be made with a 1 per cent solution of the lime-sulphur-sulphate mixture when the young shoots are from 6 to 8 in. long. During the flowering period the inflorescence alone should receive the lime-sulphur mixture. Immediately after the flowering period there should be used a 1½ per cent solution of the lime-sulphur-sulphate mixture, and about the ripening period another application of the same strength.

The roncet of the American grape in Sicily, E. PANTANELLI (*Bol. Min. Agr., Indus. e Com.* [*Rome*], *9* (*1910*), *Ser. C, No. 2, pp. 20–27; abs. in Riv. Patol. Veg., 4* (*1910*), *No. 9–10, pp. 149, 150*).—In a summary of the results of three years' study of this disease (E. S. R., 23, pp. 48, 550), the author discusses the distinction between roncet and other diseases which are often associated with it, the typical characteristics of the disease, its cause, and remedies.

The conclusion is reached that roncet is neither parasitic nor infective, but is a symptom of progressive degeneracy produced by an insufficiency of the absorbent root system, associated with certain unfavorable physical properties of the soil to which the grape is especially sensitive in the Mediterranean climate.

Spring and summer remedies against parasites of the grape, L. VIVARELLI (*Rivista* [*Conegliano*], *4. ser., 16* (*1910*), *Nos. 11, pp. 249–253; 12, pp. 277–282; 13, pp. 296–300*).—The author gives about 40 formulas and methods of application for the various liquid and dry fungicides (in powder form) used in combating six common diseases of the grape

The banana disease and other enemies of the plant in Costa Rica, H. Q. LEVY (*Jour. Jamaica Agr. Soc., 14* (*1910*), *No. 7, pp. 241–247*).—A rather elaborate description is given of the adverse conditions from which the banana fields of Costa Rica are suffering, especially in regard to the so-called banana disease, its ravages, field characteristics, and the various methods used in attempting to control it.

The adverse conditions, according to the author, are as follows: (1) Exhausted fields, (2) lack of proper drainage, (3) roasted suckers, caused by planting bananas in old river channels which have a few inches of rich soil topping beds of sand, pebbles, and bowlders, (4) grubs, (5) gophers, (6) bushy fields which are not kept free from grass, weeds, etc., and (7) the banana disease.

It is stated that in the vicinity of Bocas del Toro thousands of acres of bananas have been destroyed by the banana disease, and that in spite of all the remedies tried, none have proved of practical value in stamping out or preventing it. The disease, which is presumed to be of bacterial origin, attacks plants in all stages of their growth, on new ground, on ground where diseased plants once stood, and in either dry or wet localities.

Young plants when first attacked split from the bulb upward for 1 to 2 feet, exposing the lower layer of the sucker. Sometimes the split extends to the heart, so that finally the heart, leaf, and branch turn black and rot. With older plants, a fringe of yellow appears on the lower leaves, and in a few days the leaves turn yellow, followed shortly by a brown color. Finally all the leaves hang quite limply down the side of the sucker, and the whole tree rots to the ground, giving off a very offensive odor.

At all stages of growth, if the head or "yam" of an infected sucker be split open the heart will be found quite rotten and composed of a putrid yellow mass, while 1 inch from the outer surface a bright red streak flanked by a bright yellow one will be found, which follows all the passages into and through the roots to their extremities. In sick bunches the tips of the fingers present a pinched-in appearance. When closely confined, as in a railway car, they will ripen in 24 hours and when lifted will shed every finger.

The disease 2 years ago was confined to the Baltimore division in Costa Rica. At the rate it was then spreading, in 10 years' time there will not be a healthy banana tree in Costa Rica.

The following remedies were tried, none of which were wholly successful: (1) Cutting down all diseased plants level with the ground, thus exposing the entire root to the action of the sun; (2) taking out the entire stool, allowing the hole to remain open for some time before replanting, and cutting into small

pieces all heads, stems, and leaves, and burning by means of crude petroleum; (3) liming or watering the hole before replanting, and dipping the new piece to be planted in a weak solution of copper sulphate; (4) burning the entire section and replanting away from the old stools; (5) importing suckers from noninfected farms and other banana countries; (6) isolating diseased sections with trenches 2 ft. wide and 2½ ft. deep, filling with dry trash, and burning; and (7) spading, forking, clean weeding, and trenching.

The disease does not attack other crops, such as cassava, cowpeas, corn, cacao, and rubber, even when grown on land badly infected with the disease.

A banana disease due to nematodes, G. Korff (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 8 (1910), No. 6, pp. 61–67, figs. 3*).—A description is given of a banana disease, usually of greenhouse plants, caused by the nematode *Heterodera radicicola*, accompanied by the usual directions for controlling this disease.

Cacao canker (*Agr. News [Barbados], 9 (1910), No. 214, pp. 222, 223*).—A general discussion as to the causes of this disease is given, in which the claim made by J. B. Rorer in a recent article (E. S. R., 23, p. 549, and below) that cacao canker of the branches and pods is the same disease and is due to *Phytophthora omnivora* is especially noted.

Observations on the black rot of pods and the tree canker of the Alligator cacao indicate that in Dominica as in Trinidad the canker disease is due to *P. omnivora*. It is claimed that some varieties of cacao are highly susceptible to this disease, while others are practically immune.

In addition to the usual remedies for controlling this disease, spraying with Bordeaux mixture is recommended.

Pod rot, canker, and chupon wilt of cacao caused by Phytophthora sp., J. B. Rorer (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 65, pp. 79–103*).—In this report on tree canker and pod rot of cacao, the author gives the history of the diseases in various countries where cacao is grown, the conclusions reached as to their cause by previous investigators, and a summary of the facts concerning these diseases as brought out by a study of the literature on the subject. The characteristics of pod rot, canker, and chupon or sprout wilt, sources of infection, losses caused by these diseases, other fungi associated with them, cultural studies, life history of cacao Phytophthora, inoculation experiments with it, preventive measures, and recommendations as to its control are also considered.

As a result of a study of the literature on the subject, and his own investigations of the diseases, the author maintains that the pod rot and tree canker of cacao are probably identical in all parts of the world where cacao is grown, that they are primarily due to the fungus *Phytophthora* sp., and that the various species of Nectria, Calonectria, etc., are not the cause of this disease, but only secondary invading saprophytes.

It is stated that probably the cankers on the trees came from the fungus in the pods working its way back into the cushion and from there into the bark, and thence by strands of mycelium spreading to other areas in the inner bark of the tree.

The pod rot may originate in two ways, either by spore infection on the surface of the pod, which is the usual method, or by strands of mycelium from a canker penetrating through the stem of the pod into the pod itself. A wilt disease of the chupons is also ascribed to the same fungus. Infection occurs mainly during the rainy season from diseased pods, and the disease is kept going month after month, as pods are always on the trees.

In inoculation experiments with pure cultures of the various fungi found associated with canker and pod rot, only the Phytophthora was successful in producing infection on healthy pods with all the characteristics of the disease. Another fungus (*Diplodia cacaoicola*) was found capable of attacking healthy

tissues of cacao through wounds, producing a disease, but this was not the common canker or pod rot.

Spraying has proved the most practical and successful method for combating both pod rot and canker, but further work will have to be done before the best mixtures, times for application, machinery, etc., can be positively known. For the present, it is advocated that the trees be sprayed at least four times a year, the applications being made when the trees are well covered with young fruit, but not when in full bloom.

A bibliography of cacao diseases is appended.

A new coffee disease (Phthora vastatrix), F. H. D'Herelle (*An. Soc. Rural Argentina, 44 (1910), No. 68, pp. 40–45, figs. 14*).—In a further discussion (E. S. R., 22, p. 151) of this very destructive coffee disease, the characteristics of the fungus, its method of dissemination, and suggestions as to its control are given.

The first symptom of the disease is the appearance on the trunk near the ground of cracks in the bark, beneath which the exposed wood shows black throughout. This diseased condition extends beneath the bark to a height of 3 or 4 ft. above the ground, while the upper part of the trunk and the limbs are free from the disease.

The fungus usually invades the roots by spore infection. The death of the tree is caused by the hyphæ plugging the conducting tissues and by the destruction of the cambium.

The total duration of the disease is from 24 to 26 months, and always terminates in the death of the tree. The fruiting stroma of the fungus bearing perithecia is found beneath the bark on the blackened wood. The fungus is said to have 4 kinds of spores, viz, ascospores, conidia, pycnospores, and stylospores.

The disease also attacks 2 species of Inga (Cuxil and Paterno) used as shade trees for the coffee.

The remedies proposed for the disease are heavy liming of the soil, the use of nonacid fertilizers, so pruning the coffee plants as to obtain a better circulation of air and more sunshine on the ground, and the planting of trees for windbreaks and to catch the spores. In making new plantations it is advised that the rows be run east and west, that the coffee plants be set farther apart, and that, if shade trees are used, species of trees be planted which are not susceptible to the disease.

On the infection and germination of the uredospores of Hemileia vastatrix, F. C. von Faber (*Ber. Deut. Bot. Gesell., 28 (1910), No. 5, pp. 138–147*).—The results are given of experiments on the germination and infection of the uredospores of *H. vastatrix* under different light and moisture conditions.

It was found that the spores germinated on both sides of the leaves, but that infection occurred only on the undersurface through the stomata if moisture was present. If water remained long on the leaves the germ tubes did not form appressoria, but branched and failed to enter the stomata.

The spores germinated in the dark as well as in the light, but the germination was favored by a short exposure to strong light.

The outbreak of blister blight on tea in the Darjeeling District in 1908–9, W. McRae (*Agr. Jour. India, 5 (1910), No. 2, pp. 126–137, pls. 4, fig. 1*).—An account is given of the first appearance, dissemination, and characteristics of blister blight (*Exobasidium vexans*) in this district.

In this disease the first indication of a blister is a small, pale green, yellow, pink, or deep red circular spot which enlarges to a diameter of from ¼ to ½ in., forming a depression on the upper side of the leaf and a bulge on the lower surface. The upper concave circular area is smooth, shiny, and paler than the

rest of the leaf, while the convex under-surface is a dull, powdery gray, changing to pure white when mature.

The disease spreads from the leaves to the leaf stalks and to the young green stems, where the spots elongate and increase in size until the stem is girdled, thus causing the upper part to wilt and die.

The disease spreads rapidly, especially in regions of frequent rainfall, and is very injurious to heavily pruned bushes, often defoliating the entire plant.

Three methods of control have been tried, viz, picking off diseased material, pruning, and spraying with fungicides. Picking was fairly efficient during the early attacks of the fungus, but under weather conditions suitable for the spread of the disease was not successful in controlling it. Spraying with Bordeaux mixture at certain stations proved very effective both in checking the ravages of the disease and in preventing fresh outbreaks, but in regions of heavy rainfall the fungicide did not remain long enough on the leaves to prevent incipient blisters from maturing. In seed beds, new extensions, and heavy pruning, however, where the area is small, the labor and expense of repeated spraying would be well repaid by saving the plants. During cold weather the main remedy should consist of pruning out all infected growth and the destruction of the diseased prunings by burning or by burying them under at least 1½ ft. of earth.

Report on a disease in tea seed nurseries, G. D. Hope (*Indian Tea Assoc. [Pamphlet] 5, 1909, pp. 6, pls. 3*).—The results are given of investigations on the disease which attacked nursery tea seedlings in the Dibrugarh and Doom Dooma districts of Assam during the season of 1909.

This disease appeared about the end of June in the upper Assam tea districts, and in some instances as much as 50 per cent of the seedlings turned black from the topmost shoot downward. The side leaves assumed a coppery appearance in patches, and eventually the shoot died.

It is claimed that the disease is caused by the peculiar climatic conditions which prevailed throughout these districts during 1909. In the early part of the season there was a prolonged drought, followed by continuous and heavy rains for about two weeks, and immediately succeeded by several extremely hot days during which the disease appeared and many seedlings died.

The diseases of Hevea brasiliensis, N. Patouillard (*Jour. Agr. Trop., 10 (1910), No. 108, pp. 170, 171*).—A brief description is given of the root disease of *H. brasiliensis*, due presumably to some hymenomycete, followed by a list of fungi which attack the leaves, branches, and fruit of Hevea.

Another Para rubber fungus, H. N. Ridley (*Agr. Bul. Straits and Fed. Malay States, 9 (1910), No. 6, pp. 216–218*).—A description is given of the fungus in the trunks of Para rubber trees, which, after the tree is dead, forms an irregular, oval-shaped, black, hard and rather brittle crust from $\frac{1}{16}$ to $\frac{1}{4}$ in. thick and from 1 to 10 in. in diameter beneath the outer corky layer of bark, which has split off in places.

One tree 25 years old and 2 ft. in diameter died suddenly without previous evidence of disease, and this fungus came out on the wood some weeks later. Trees adjacent to this have died in much the same manner.

A section of diseased wood was sent to Kew for examination. According to G. Massee the fungus belongs to the genus Eutypa and will be called *E. caulivora* n. sp. A constant feature of this genus is that the fungus persistently remains in a vegetative and aggressive condition in the body of the tree until the host is dead, and then comes to the surface to produce fruit. As the fungus does not fruit until after the tree is dead, it is suggested that it could be readily controlled by destroying all dead trees and timber in or near the plantations.

On the nonoccurrence of rust uredo-sori on the needles of conifers, K. von Tubeuf (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 7, pp. 346–349*).—It is

claimed that coniferous plants have only æcidiospore or teleutospore sori because the stomata of such plants are closed with a waxy cork or plug, which prevents the germ tubes of æcidiospores or uredospores from entering the leaves. As they can not bore directly through the epidermis, the alternate stages of this rust must infest plants in which the stomata are open. In the case of the æcidio-sori, and in the cases so far known (*Chrysomyxa abietis*) of teleutospore sori, forming on the needles, both are produced by sporidia with germ tubes able to bore through the epidermis.

Two new fir-inhabiting fungi, F. BUBÁK (*Naturw. Ztschr. Forst u. Landw.*, 8 (*1910*), *No. 6, pp. 313–320, figs. 7*).—Technical descriptions are given of *Phoma bohemica* n. sp., and *Rehmiellopsis bohemica* n. g. and sp., the fruiting bodies of which were found on the dead needles of the young branches of fir trees in Bohemia. The needles on the diseased branches were shriveled, dry, and dark brown in color.

West Hungarian pines in West Prussia succumbing to attacks of leaf-cast fungi, E. HERRMANN (*Naturw. Ztschr. Forst u. Landw.*, 8 (*1910*), *No. 2, pp. 105–109*).—From careful observations of pines attacked by leaf-cast fungi, the author holds that pines grown from west Hungarian seed under the climatic conditions of West Prussia, in spite of spraying with Bordeaux and soda Bordeaux mixtures, are very susceptible to this disease.

A disease of the alder, W. S. JONES (*Quart. Jour. Forestry, 3* (*1910*), *No. 4, pp. 221–224, figs. 4*).—A description is given of a disease of the alder in Wimborne, in which the leaves shrivel up and the stems show dark spots that gradually increase in size until the branch dies. In this manner the trees die from the top downward. On the dead tissues are numerous small black fructifications of the fungus, which on examination proved to be *Valsa oxystoma*.

Trochila populorum, C. W. EDGERTON (*Mycologia, 2* (*1910*), *No. 4, pp. 169–173, figs. 7*).—Attention is called to the probable identity of the discomycete *T. populorum* with the common poplar fungus (*Marsonia castagnei*) as indicated by cultural experiments with both fungi.

Some parasitic Polyporaceæ, C. D. LEARN (*Proc. Iowa Acad. Sci., 16* (*1909*), *pp. 23–29, pls. 5*).—A study has been made of certain species of Polyporaceæ, and descriptions are given of the characteristic changes which their mycelia produce in the wood of the trees in which they grow.

The species discussed are *Pyropolyporus igniarius*, *P. everhartii*, *P. fulvus*, and *Elfvingia megaloma*, the most characteristic and common wound parasites infesting the chief forest trees of Iowa.

On fungi destructive to wood, C. RUMBOLD (*Ann. Sci. Agron., 3. ser., 5* (*1910*), *I, Nos. 4, pp. 282–296, figs. 11; 5, pp. 321–351, figs. 7; 6, pp. 401–432, figs. 2*).—Results are given of investigations on the culture, development, conditions of existence, and characteristics of the following fungi which are destructive to wood: *Agaricus adiposus*, *A. melleus*, *Coniophora cerebella*, *Dædalea quercina*, *Lenzites abietina*, *L. sepiaria*, *Merulius lacrymans*, *Polyporus annosus*, *P. betulinus*, *P. fomentarius*, *P. fulvus*, *P. igniarius*, *P. pinicola*, *P. vaporarius*, and *Schizophyllum alneum*.

The carnation rust, L. FONDARD (*Rev. Hort.* [*Paris*], *82* (*1910*), *No. 14, pp. 336–338, fig. 1*).—A popular description is given of this fungus (*Uromyces caryophyllinus*), the conditions favoring its development, and methods of combating it. The two most efficient treatments were found to be a thorough dusting with sulphur, and spraying with copper sulphate.

Gladiolus bulb rots, E. WALLACE (*Gardening, 18* (*1910*), *No. 428, pp. 308, 309, figs. 2*).—A preliminary report is made of an examination of diseased gladiolus bulbs from which three different fungi have been isolated, grown in

pure cultures, and the diseases reproduced by artificial inoculation. Arrangements have been made with growers for cooperative experiments in the control of these diseases, and a full account of the fungi and the diseases is to appear later in a bulletin of the Cornell Experiment Station.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

A text-book of field zoology, LOTTIE E. CRARY (*Philadelphia, 1910, pp. XII+364, figs. 117*).—This work is devoted to insects, other arthropods, and birds.

A diary of the travels of a naturalist in Darien and Ecuador, E. FESTA (*Nel Darien e nell' Ecuador. Diario di viaggio di un Naturalista. Turin, 1909, pp. XVI+397; rev. in Nature [London], 82 (1910), No. 2103, pp. 452, 453*).—An account of the author's travels from May to September, 1895, in Panama, and from September, 1895 to April, 1898 in Ecuador. About 500 specimens of mammals, more than 3,000 birds, 150 different kinds of reptiles and amphibians, and as many kinds of fishes and invertebrates were collected and given to the Royal Museum at Turin.

Family distribution and faunal areas, N. BANKS (*Proc. Ent. Soc. Wash., 12 (1910), No. 2, pp. 88–98*).—The author shows that no one map of faunal areas can explain the distribution of all groups, since the faunal areas vary with the family or even with the genus.

The common mole, T. H. SCHEFFER (*Kansas Sta. Bul. 168, pp. 36, figs. 10*).—In the first part of this bulletin the author describes the so-called common garden mole (*Scalopus aquaticus intermedius*), its life history and bionomics. This, the only species that occurs in Kansas, is common in the eastern half of the State, being abundant in the eastern third. In western Kansas it is entirely absent, or found only occasionally along water courses. The mole thrives best in a loose, moist soil abounding in grubs and earthworms. It frequents fields and woods shaded by vegetation, but is not able to maintain existence in the hard, compact soil of semiarid regions. It does not hibernate, but is more or less active at all seasons of the year. During the rainy periods of summer its work is pushed the most vigorously.

The results of examinations of 38 female moles for breeding conditions are reported. The diet of moles consists almost exclusively of the various insects, grubs, and worms to be found in the soil. The amount of vegetable substance found in stomach examinations is usually no more than might have been taken in incidental to the ingestion of other food. Of 100 stomachs examined white grubs were found in 64, earthworms in 49, beetles in 67, beetle larvæ in 44, other larvæ in 25, centipedes in 25, ants in 19, wasps in 7, flies in 2, plant fibers and rootlets in 43, seed pods or husks in 8, crickets in 10, insect fragments in 31, puparia in 21, cocoons in 10, spiders in 23, grasshoppers in 2, bugs in 3, skin of grain or roots in 6, and hair-worm in 1. Twenty-eight were found to be infested with parasitic threadworms.

It was found to be a difficult matter to keep a mole in captivity for any considerable length of time, as either fright or worry or lack of proper food in sufficient quantity soon terminated the life of each captive.

Because of its secluded life, the mole has but few natural enemies. The flooding of lowlands during spring freshets is probably the greatest danger that menaces the adult mole and its progeny. "From the standpoint of food habits, and also in respect to tunneling the soil, the work of the mole is highly beneficial to the interests of agriculture. Moles should not be tolerated, however, in lawns, small garden plats and parks, because of the disfigurement and the injury to plant roots that result from their work. The labyrinth of tunnels con-

structed by the mole serves as passageways for several species of mice, which are alone responsible for most of the damage to seeds, roots, and tubers encountered in the soil. The best method of combating the mole is by means of a trap in the hands of a person who knows how to set it. Crystals of strychnin in raisins or bits of fresh meat make fairly effective poison baits.

"Mice which take seed corn in the ground may be destroyed by introducing poisoned grain baits into mole runways throughout the field. The theft of seed corn may sometimes be prevented by treating it with coal tar, tobacco decoction, or stock dip before planting."

Rat virus in Jamaica, S. F. ASHBY (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1909), No. 2, pp. 97-102*).—An account is given of rat viruses and the work with them at the government laboratory.

During the 3 months, June, July, and August, 1908, 2,078 rats inoculated with a Danysz virus, which has been adapted to the field rats of Mexico, were distributed in town and country. After an interval of a month, 72 replies were received accounting for 1,500 of the rats distributed. Twenty-two of these reported a disappearance of all rats, which showed success in conveying the infection to healthy ones, for about 20 per cent of the rats distributed and 30 per cent of the localities selected.

The best results with Danysz virus received from London were obtained when the virus was grown in milk at a constant temperature for 24 hours, irrespective of whether the temperatures were from 68 to 98° F., even with the adapted virus, however, the method of treatment recommended by the Danysz agency proved very uncertain. "The Mexican virus, Danysz virus, Liverpool virus, and Azoa contain the same organism, and the success obtained either with the original preparations of those or any of the other kinds tried is either very uncertain or totally wanting."

Notes from the bacteriological laboratory, S. F. ASHBY (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1910), No. 3, pp. 175, 176, pl. 1*).—Since the account above noted was prepared, the method of cultivating the Danysz virus in milk has been further tested and developed.

"A procedure which has repeatedly secured a mortality of 80 per cent or more within 10 days in experiments on caged rats is the following: The virus is grown for one or two days on an agar slope at blood heat; the growth is transferred to about a quart of sterile milk which is incubated for one day at blood heat and then soaked into small cubes of white bread which have been well dried. The sponge obtained in that way is packed at once closely into tins and sent away for distribution without delay. The bait should be set within 24 hours of preparation and kept cool in the meantime. It is scattered in likely places in small portions loosely wrapped in paper of the kind used for printing newspapers. . . . Rats appear to take this bread milk bait very readily and should contract disease and die within 10 days."

Three of several mongoose on which this virus was tested contracted the disease and died within a few days after being fed living rats which showed symptoms of disease caused by the virus that had been fed to them. The specific organism was obtained from the spleens of the dead mongoose and cultures of it inoculated into rats killed them in the way characteristic of the virus.

Measles and mice.—Does the microbe of measles come from the mouse? A. F. A. KING (*Washington Med. Ann., 9 (1910), No. 1, pp. 49-61; abs. in Jour. Amer. Med. Assoc., 54 (1910), No. 18, p. 1479*).—Numerous instances are cited which point to an etiologic relationship between mice and measles.

The evidence of plague infection among ground squirrels, G. W. McCoy (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 25 (1910), No. 2, pp. 27–33*).—The author considers the subject first in relation to ground squirrels, and, second, somewhat less fully in relation to human cases.

Campaign against bubonic plague in ground squirrels (Citellus beecheyi) in California, W. C. Rucker (*Jour. Trop. Med. and Hyg. [London], 13 (1910), No. 6, pp. 87–90, fig. 1*).—A brief review of the campaign now being carried on.

Instinct and intelligence of birds, F. H. Herrick (*Pop. Sci. Mo., 76 (1910), No. 6, pp. 532–556; 77 (1910), Nos. 1, pp. 82–97; 2, pp. 122–141, figs. 34*).—Many new observations on the bionomics of birds are included in this account.

Nests and eggs of birds found breeding in Australia and Tasmania, A. J. North (*Aust. Mus., Sydney, Spec. Cat., No. 1, vol. 2, pts. 1–3, pp. VII+380, pls. 11, figs. 75*).—"The present and second volume contains descriptions of the nests and eggs of 175 species of Australian and Tasmanian birds, and is partly based on the collections in the Australian Museum, and the remainder chiefly on private collections. The birds enumerated form the concluding portion of the order Passeres, and belong to the families Laniidæ, Certhiidæ, Sittidæ, Meliphagidæ, Nectariniidæ, Zosteropidæ, Dicæidæ, Pardalotidæ, Hirundinidæ, Artamidæ, Sturnidæ, Ploceidæ, Motacillidæ, Alaudidæ, Pittidæ, and Menuridæ. It also includes the greater portion of the order Picariæ, comprising the families Caprimulgidæ, Podargidæ, Coraciidæ, Meropidæ, and Alcedinidæ. . . . One hundred and seventy-five species of Australian and Tasmanian birds are described."

Notes on the birds of Argentina, E. Hartert and S. Venturi (*Novitates Zool., 16 (1909), No. 2, pp. 159–267, pls. 2*).—These notes on 500 forms are based on a manuscript by S. Venturi on the nidification, eggs, and habits of Argentine birds and collections by several other authors.

Food of the bobwhite, Margaret M. Nice (*Jour. Econ. Ent., 3 (1910), No. 3, pp. 295–313*).—A list is given and data presented as to the various weeds the seeds of which are eaten, and the insects destroyed, by the bobwhite.

"A single bird was found to eat as many as 12,000, 18,000, and 30,000 seeds of one kind of weed in a day. They eat 15 gm. or half an ounce, of weed seed daily throughout the winter. The known list of insects eaten (135) includes many of the most injurious species. A single bird ate at one meal 568 mosquitoes; another during a day ate 1,350 flies; a third ate 5,000 plant lice; while still another record is 1,532 insects, 1,000 of which were grasshoppers. Bobwhites eat from 12 to 24 gm. of insects daily in the summer. In a study of the growth and feeding of one bobwhite, it was found that in his third week he ate half of his weight of insects, in his fourth week one-third. In the sixth the addition of grain brought it up to one-half again. When adult they eat from one-twelfth to one-sixth of their weight. An estimate of the average amount eaten by a bobwhite in a year is 2,732 gm., or about 5 lbs., of insects, and 4,681 gm., or about 9 3/4 lbs., of weed seeds, which are equivalent to 65,302 insects and 5,123,076 weed seeds."

Some observations on the food habits of the blue jay (Cyanocitta cristata), L. L. Dyche (*Trans. Kans. Acad. Sci., 21 (1907), pt. 1, pp. 130–137*).—The author reports the results of an examination made of a large number of stomachs of blue jays collected in the vicinity of Lawrence, Kans. The species is shown to destroy the eggs and young of other birds and even chickens.

An apparatus for the determination of optimums of temperature and moisture, T. J. Headlee (*Ann. Ent. Soc. Amer., 3 (1910), No. 2, pp. 145–153, figs. 3*).—This apparatus, designed particularly for the study of insects, is described and figured.

Guide to the exhibited series of insects in the department of zoology, British Museum (Natural History), S. F. HARMER ET AL. (*London, 1909, 2. ed., pp. 64, pls. 13, figs. 39*).—The figures presented in this guide are said to have been specially prepared for the work from specimens in the British Museum.

Report of official entomologist, T. J. HEADLEE (*Trans. Kans. State Hort. Soc., 30 (1908), pp. 148–155, figs. 4*).—Six winter nests of the brown-tail moth, averaging about 150 caterpillars each, were found in foreign shipments of nursery stock received in Kansas in 1909. The San José scale is now known to infest seriously considerable areas in Wyandotte, Jackson, Doniphan, and Jewell counties.

Fifth annual report of the state entomologist of the State of Maine, E. F. HITCHINGS (*Ann. Rpt. State Ent. Maine, 5 (1909), pp. 46, pls. 11*).—A brief account is given of the insects affecting small fruits, fruit tree pests, etc. Under the report of nursery inspection, a list is given of the nurseries in Maine and of the nursery agents licensed during the year. The work has been much increased by recent state legislation.

A report by E. E. Philbrook, special field agent in charge of gipsy moth work, is appended (pp. 35–46).

Some insect invasions, and the fight against them, J. B. SMITH (*Ann. Rpt. N. J. Bd. Agr., 37 (1909), pp. 181–195, figs. 11*).—A brief discussion of some of the more important insect pests that have been introduced into this country. The fact that a small sum, comparatively speaking, invested in preventive measures will give results that can not be expected from many times the amount spent for destructive measures after the insects have once become established, is emphasized.

Report of committee on entomology, H. A. GOSSARD (*Ohio State Hort. Soc. Ann. Rpt., 42 (1909), pp. 76–86, figs. 2*).—In addition to work with the codling moth, which has been previously noted from another source (E. S. R., 21, p. 352), a brief account is given of the injury to peach and cherry trees by bark beetles (*Scolytus rugulosus* and *Phlœotribus liminaris*).

Annual report for 1909 of the zoologist, C. WARBURTON (*Jour. Roy. Agr. Soc. England, 70 (1909), pp. 355–361*).—A brief report of the occurrence of insects affecting forest, field, and garden crops, and of animal parasites is given.

Insect pests in 1909 (*Agr. News [Barbados], 9 (1910), No. 201, p. 10*).—A brief summary of the more important West Indian insect pests of sugar cane, cotton, limes, oranges, guavas, cacao, sweet potato, and corn.

Entomological notes, W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 20 (1909), No. 9, pp. 773–778, pl. 1*).—A number of brief articles including an account of an injury to Unganda hemp by *Danais menippa*, wireworms affecting oats, and a native bee (*Sarapoda bombiformis*) said to fertilize red clover.

Report of the entomologist, 1908–9, T. J. ANDERSON (*Dept. Agr. Brit. East Africa An. Rpt. 1908–9, pp. 90–97, pls. 6*).—In this first annual report the author discusses briefly the insects causing annoyance to man and those injurious to domestic animals, stored grain, coffee, orchard and garden crops, citrus trees, cotton, and other crops. It is announced that an ordinance is being drafted to make provision for the examination of imported plants and seeds.

Two well-known pests in the Transvaal, D. GUNN (*Transvaal Dept. Agr., Farmers' Bul. 88, pp. 7, figs. 4*).—Noted from another source (E. S. R., 23, p. 658).

Some insects injurious to stored grain, D. GUNN (*Transvaal Dept. Agr., Farmers' Bul. 86, pp. 8, figs. 5*).—Noted from another source (E. S. R., 23, p. 658).

[Insect enemies of the almond tree,] V. MAYET (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 14, pp. 414–417, pl. 1*).—A brief account is given of

Aphis amygdali, Pieris cratægi, Papilio podalirius, Zygæna infausta, Noctua cæruleocephala, Cerambyx miles, and *Caphnodis tenebrionis.*

Concerning some insects collected and bred from dead and dying elm, E. S. TUCKER (*Trans. Kans. Acad. Sci., 21 (1907), pt. 1, pp. 158–162*).—A report of observations made at Lawrence, Kans.

On some insect pests of the Himalayan oaks (Quercus dilatata and Q. incana), E. P. STEBBING (*Indian Forest Rec., 2 (1909), No. 1, pp. 28, pls. 8*).—In part 1 the buprestid beetle of the oaks (*Amorphosoma?* sp.), in part 2 the longicorn (Cerambycidæ) beetles of the oaks, in part 3 the scolytid (Scolytidæ) and platypid (Platypidæ) bark and wood beetles, and in part 4 the scale insect of the oak (*Kermes himalayensis*), are taken up.

Some insects injurious to forests (*U. S. Dept. Agr., Bur. Ent. Bul. 58, pp. VII+103–114*).—These pages contain the contents and index of the bulletin.

Catalogue of the Odonata of North America, R. A. MUTTKOWSKI (*Milwaukee, 1910, vol. 1, pp. 207*).—The author catalogues 494 forms (not including 27 fossil species) which are said to constitute 18.77 per cent of the total number of known Odonata (2,631). The present location of types so far as could be ascertained, actual places of collection of the species, their zonal distribution, etc., are recorded.

The fauna of British India including Ceylon and Burma.—Dermaptera, M. BURR (*London and Berlin, 1910, pp. XVIII+217, pls. 10, figs. 16; rev. in Science, n. ser., 31 (1910), No. 799, pp. 627, 628*).—The author describes 133 recognized species of earwigs as occurring in British India. The types of most of these were examined and nearly all of the species are figured. He gives an outline classification of the species, and an account of their structural characteristics, development, habits, food, maternal care of young, and geographical distribution. They are known to be carnivorous and are probably omnivorous.

The literature relating to the subject is listed.

Description of a new kind of apterous earwig, apparently parasitic on a bat, K. JORDAN (*Novitates Zool., 16 (1909), No. 2, pp. 313–326, pls. 3*).—This insect (*Arixenia esau*, n. gen. and n. sp.) was taken in the sack formed by the membrane of the wings of *Cheiromeles torquatus*, the naked bat of the Sunda Islands.

A synonymic catalogue of Orthoptera, W. F. KIRBY (*London, 1904, vol. 1, pp. X+501+25; 1906, vol. 2, pp. VIII+562+25; 1910, vol. 3, pp. VII+674+28*).—The last of the 3 volumes, which has just appeared, completes the author's general catalogue of the order Orthoptera. Volume 1 takes up the Forficulidæ, Hemimeridæ, Blattidæ, Mantidæ, and Phasmidæ; volume 2, the Achetidæ and Phasgonuridæ; and volume 3, the Locustidæ or Acridiidæ.

Locusts in Australia and other countries, W. W. FROGGATT (*Dept. Agr. N. S. Wales, Farmers' Bul. 29, pp. 40, figs. 12*).—A summarized account of locusts and their control in Australia, Hungary, United States, Canada, South America, Cyprus, India, South Africa, Algeria, Mesopotamia, and Tunis, followed by a somewhat extended discussion of the parasites of locusts. A list of the papers and reports consulted is appended.

Locust destruction in South Africa, C. W. HOWARD (*Jour. Econ. Ent., 3 (1910), No. 3, pp. 260–272, pl. 1, figs. 2*).—A description of the work as now carried on in South Africa.

A memoir on the anatomy and life history of the homopterous insect Pyrops candelaria or candle fly, J. C. W. KERSHAW and G. W. KIRKALDY (*Zool. Jahrb., Abt. System. Geogr. u. Biol. Tiere, 29 (1910), No. 2, pp. 105–124, pls. 3*).—The authors state that the so-called candle fly (*P. candelaria*) is entirely without light-giving powers.

The adults feed almost entirely on longan (*Nephelium longana*) and the mango tree (*Mangifera indica*), chiefly on the former. Both nymphs and

adults prefer to suck the thick bark of the trunk and larger boughs, but the nymphs will feed on various plants. From 50 to 100 eggs, usually about 80, are contained in each oötheca, deposited on the trunk or one of the larger boughs of a longan tree or mango. "The eggs hatch in about 26 days, the first molt occurs in about 24 days from hatching, the next three molts at intervals of about 15 days, and the final molt in about 40 days, the entire nymphal period being about 109 days, and from laying of egg to adult insect about 135 days."

A mite is said to live in the wax which collects over the spiracles and in the wax pockets. The larvæ of a moth (*Epipyrops anomala*) are parasitic on the adult Pyrops, 2 or 3 larvæ often being found on one candle fly. The eggs are said to be parasitized, probably by chalcidids.

Notes on three species of Jassidæ, R. L. WEBSTER (*Ent. News, 21 (1910), No. 6, pp. 265–268*).—Biological notes upon *Empoasca obtusa*, *E. mali*, and *Typhlocyba rosæ* are presented.

A revision of the American species of Platymetopius, E. P. VAN DUZEE (*Ann. Ent. Soc. Amer., 3 (1910), No. 3, pp. 214–231*).—Twenty-six species of this jassid genus are described, of which 4 are new to science.

Investigations of Toxoptera graminum and its parasites, F. M. WEBSTER (*Ann. Ent. Soc. Amer., 2 (1909), No. 2, pp. 67–87, figs. 13*).—Substantially noted as Circular 93 of the Bureau of Entomology of this Department (E. S. R., 19, p. 452).

The life cycle of Hormaphis hamamelidis, T. H. MORGAN and A. F. SHULL (*Ann. Ent. Soc. Amer., 3 (1910), No. 2, pp. 144–146*).—The authors' observations show that the birch is not a necessary link in the life cycle of this aphid.

Gall aphids of the elm, EDITH M. PATCH (*Maine Sta. Bul. 181, pp. 193–240, pls. 13*).—In this work the author has correlated the previously existing records relating to the gall aphids of the elm so that they are presented as a unit. "The original descriptions of all the species have been quoted verbatim, as these are for the most part no longer available and a reference to them is necessary. Some entirely new data, for the most part slight, I have been able to add to each of the old species considered."

Seven species are thus treated, namely, *Colopha ulmicola*, *Tetraneura graminis colophoidea*, *T. ulmisacculi* n. sp., *T. ulmi*, *Pemphigus ulmifusus*, *Schizoneura americana*, and *S. rileyi*. The information furnished includes an account of the fate of the migrants of *S. americana* and the relation of this species to *rileyi*, the complete life cycle of *T. graminis colophoidea* and of *C. ulmicola*, the relation of *C. ulmicola* and *T. graminis colophoidea*, whether distinct species or dimorphic forms of the same, the fate of the migrants of *P. ulmifusus*, and *T. ulmisacculi* and their alternate hosts, and the relation of the American species to the corresponding European species. A bibliography arranged chronologically is given for each species.

Four rare aphid genera from Maine, EDITH M. PATCH (*Maine Sta. Bul. 182, pp. 241–248, pls. 6*).—Descriptions are given of 3 European species collected by the author at Oronto, Me., viz, *Sipha glyceriæ*, collected from rush (*Juncus* sp.), *Mindarus abietinus* from leaves of white pine, balsam fir and spruce, and *Symdobius oblongus* found to be gregarious upon the branches of birch (*Betula papyifera*). *M. abietinus* is said to develop in curled tips of *Abies balsamea* and *Picea canadensis*. It migrates from infested *P. canadensis* twigs about mid-June, immediately after acquiring wings.

A description is also given of *Mastopoda pteridis*, a species recorded in 1886 from Minnesota, which has been collected by the author near Orono from the brake fern.

Observations on a gall aphid (Aphis atriplicis), P. HAYHURST (*Ann. Ent. Soc. Amer., 2 (1909), No. 2, pp. 88–99, pl. 1*).—Biological observations with descriptions of the stages observed. This aphid colonizes the upper surface of the leaves of *Chenopodium album* and *Atriplex patula*. Several species of parasites were reared. A bibliography is appended to the account.

[Recent publications on Chermes], O. NÜSSLIN (*Zool. Zentbl., 16 (1909), No. 21–22, pp. 649–673*).—A critical review of the literature.

Webber's brown fungus of the citrus white fly (Ægerita webberi n. sp.), H. S. FAWCETT (*Science, n. ser., 31 (1910), No. 806, pp. 912, 913*).—This fungus, a parasite of the citrus white fly, previously described by Webber (E. S. R., 9, p. 658) under the name of brown fungus, is designated by the author as *Ægerita webberi.*

The scale insects of citrus trees, C. W. HOWARD (*Transvaal Dept. Agr., Farmers' Bul. 75, pp. 20, figs. 7*).—The red scale (*Chrysomphalus aurantii*) is stated to be the most destructive coccid that affects citrus fruits in the Transvaal. The Florida red scale is found in the Transvaal mostly in the low veld along the eastern borders. In the dryer parts it is often found upon palms in greenhouses and in Natal seems to prefer the coastal belt. The purple scale, often associated with the Florida red scale, is confined to the same warm humid areas in South Africa. Glover's scale is not very common, being found in the Transvaal only at Warmbaths. The circular white scale (*Aspidiotus hederæ*) has only once been reported as a pest of citrus trees in the Transvaal, but in Natal it frequently attacks rough lemons. The soft scale is said to be a serious pest of citrus trees in the Transvaal, although highly parasitized by a small chalcidid. The black scale has been reported but once and the cottony cushion scale is not considered a serious pest.

Scale insects affecting coffee estates, R. D. ANSTEAD (*Planters' Chron., 5 (1910), Nos. 19, pp. 222–224; 20, pp. 234–236; 21, pp. 247–249*).—The coccids mentioned as usually found attacking coffee and its shade trees in southern India are the so-called green bug (*Lecanium viride*), brown bug (*L. hemisphæricum*), red cedar scale (*L. imbricans*), silver oak scale (*L. formicarii*), black bug (*L. nigrum*), green mealy scale (*Pulvinaria psidii*), and *Dactilopius citri.* The natural enemies of and remedial measures for these pests are briefly considered.

Catalogue of the Lepidoptera Phalænæ in the British Museum, G. F. HAMPSON (*London, 1909, vol. 8, pp. XIV+583+28, pls. 14, figs. 162; 1910, vol. 9, pp. XV+552+28, pls. 11, figs. 247*).—The Acronyctinæ are continued in these volumes. A key to the genera, which appeared in volume 7 (E. S. R., 21, p. 760), is reprinted with some additions and corrections in both of the present volumes.

In volume 8, 720 species are listed with descriptions and in volume 9, 676. Many of the species are illustrated in color.

A natural history of the British Lepidoptera, their world-wide variation, and geographical distribution, J. W. TUTT (*London and Berlin, 1905, vol. 8, pp. III+479, pls. 20; 1907–8, vol. 9, pp. X+494, pls. 28; 1908–9, vol. 10, pp. VIII+410, pls. 53*).—These volumes, devoted to British butterflies, are a continuation of the work previously noted (E. S. R., 18, p. 1144) of which volumes 6 and 7 are still unpublished.

In volume 8 the first part is devoted to general observations and the second part to 10 species of butterflies. In volume 9 the estivation, hibernation, and gregarious and family habits of butterfly larvæ are considered, followed by accounts of 7 species. Part 1 of volume 10 takes up the family habits of butterfly larvæ following which 5 species are discussed. The species considered are traced through their extreme range of variation and geographical distribution and their life history worked out in detail.

Researches on the development of the egg of the univoltin silk moth, C. VANEY and A. CONTE (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 9, pp. 553–555; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 3, p. 305*).—The authors distinguish 3 periods in the development of the "univoltin" egg: (1) The period of the formation of the germinative "bandelette" and the vitellin elements (about 5 days); (2) the period of latent life without appreciable embryonic changes (9 months); and (3) the period of embryonic construction, in the course of which (about 10 days) a caterpillar is formed.

On the jaundice parasite of Bombyx mori (Mycrosporidium polyedricum), V. MARZOCCHI (*Ann. R. Accad. Agr. Torino, 52 (1909), pp. 83–96; Arch. Par., 12 (1909), No. 3, pp. 456–466, fig. 1; abs. in Bul. Inst. Pasteur, 7 (1909), No. 15, pp. 644, 645*).—A contribution on *M. polyedricum* from the laboratory of parasitology at the University of Torino.

The Demerara silkworm (*Jour. Bd. Agr. Brit. Guiana, 3 (1909), No. 2, pp. 63–67*).—Wild cocoons of the Demerara silkworm (*Attacus hesperus*) at Georgetown are occasionally badly parasitized. In Guiana, the old witch bird (*Crotophaga major*) is said sometimes to raid a tree covered with a brood of silkworms and to clear them all off in the space of a few hours.

The butterflies and larger moths affecting forestry in Britain, B. W. ADKIN (*Quart. Jour. Forestry, 4 (1910), No. 1, pp. 9–30*).—A brief general account of these enemies of forests.

Description of some new South American Arctiadæ, with notes, W. ROTHSCHILD (*Novitates Zool., 16 (1909), No. 2, pp. 268–299*).—One hundred and twenty-nine forms are described as new to science.

Some experiments on the resistance of gipsy moth eggs to the digestive fluids of birds, W. REIFF (*Psyche, 17 (1910), No. 4, pp. 161–164*).—From experiments conducted in which foreign birds were used, it was found that gipsy moth eggs can withstand the action of the digestive fluids of birds belonging to at least 2 families, Turdidæ and Bubonidæ, without suffering any, or only slight, injury. The author is also inclined to think that birds of the family Fringillidæ may also occasionally distribute gipsy moth eggs in spite of the negative results obtained in his experiments.

Some insects injurious to truck crops.—Biologic and economic notes on the yellow-bear caterpillar, H. O. MARSH (*U. S. Dept. Agr., Bur. Ent. Bul. 82, pt. 5, pp. 59–66, fig. 1*).—This is a report of observations made of *Diacrisia* (*Spilosoma*) *virginica* in Colorado which were commenced in July, 1909.

During the late summer and fall of that year there was a serious outbreak of this pest in the upper Arkansas Valley of the State. "The larvæ, or caterpillars, of the first generation developed normally on weeds along the fences and irrigation ditches and caused little damage to cultivated crops, but the larvæ of the second generation, which began to develop about the middle of August, were so numerous that the weeds were not sufficient to support them and they spread to sugar beets and other crops. The sugar beets, because of the extensive acreage and the large supply of food which their tender foliage offered, were more severely damaged than any other crop. The larvæ were variously estimated to have infested from 15,000 to 20,000 acres of sugar beets in the upper portion of the Arkansas Valley. Definite records from this vast acreage show that fully 1,000 acres were badly defoliated." Estimates based on comparative analyses made by the chemists at the various sugar factories indicated that there was a loss in sugar content of from 1 to 3 per cent over the badly defoliated area.

Biologic notes based largely on observations made at Rocky Ford, Colo., are presented. It is stated that by September 6 the infestation had become general and that there was probably not a field of beets in the Rocky Ford district in which larvæ were not present at least in small numbers.

A list is given of some 45 food plants that were found to be injured, and details of spraying experiments with arsenicals are reported. Arsenate of lead was entirely ineffective against the larvæ on sugar beets and celery, even when applied at an excessive strength by hand or machine sprayers. "Paris green, when applied very thoroughly by hand to celery, gave perfect results when used at excessive strengths, but when applied to sugar beets with a machine sprayer (the only practical method with such a crop) it, too, proved ineffective. . . . Judging from the results of these experiments, the arsenicals can not be depended on to control the larvæ on sugar beets. It is evident that clean cultural methods offer the best chance of keeping this species under control." It is thought that much benefit will be gained by keeping the ditch banks and spaces along the fences free from weeds. The burning of weeds, grass, etc., under which the pupæ find protection is an excellent method of combating the pest.

The pine procession moth in the forests of Galicia, A. GARCIA-VARELA (*Bol. R. Soc. Españ. Hist. Nat., 9 (1909), No. 4, pp. 192–194; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 6, p. 716*).—The author describes the ravages of *Cnethocampa pityocampa* among the pines (*Pinus pinaster*) in Galicia, and discusses the best means of dealing with them. The importance of ichneumonid, braconid, and chalcidid parasites and other natural enemies is emphasized.

The plum webworm, E. RABATÉ and J. BERNÈS (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), Nos. 36, pp. 291–300, pl. 1, figs. 10; 37, pp. 327–333; 38, pp. 352–362; 39, pp. 389–393*).—An account is given of the life history and remedial measures for *Hyponomeuta padella*, which appears periodically and is a source of considerable injury in a number of departments in southern France

The insecticide treatment for the fruit-tree webworms, J. CAPUS and J. FEYTAUD (*Rev. Vit., 32 (1909), Nos. 820, pp. 258–261; 822, pp. 313–319*).—Directions for combating *Hyponomeuta cognatella*, *H. malinella*, and *H. padella* are given.

Papers on deciduous fruit insects and insecticides.—On the nut-feeding habits of the codling moth, S. W. FOSTER (*U. S. Dept. Agr., Bur. Ent. Bul. 80, pt. 5, pp. 67–70, pls. 2*).—The author reports that in October, 1909, 50 per cent of the English walnuts growing upon a tree near a pear-packing shed at Concord, Cal., were found to be infested by the codling moth.

"Larvæ in all stages from a few days old to full grown were found. Egg-shells also were found on the outside of the hull of the nuts and on the leaves, indicating that the eggs had been placed by the moth on fruit and foliage promiscuously, as is customary in the case of apple and pear." Some of the larvæ thrive for a time on the fleshy hull before entering the kernel, but in all cases observed they left the hull and entered the kernel before reaching maturity. The majority of the larvæ go at once into the nut, and in any case they enter through the fibrous tissue connecting the halves of the shell at the base or the stem end. They may bore into the lobes of the kernel or feed on its surface. Some eat over a large portion next to the shell, some follow along the central area, while others may spend all the time near the entrance, eating away a larger portion of the kernel at this place. In any case the entire kernel is rendered rancid and unsuited for human consumption.

"Extended search throughout the central part of Contra Costa County, Cal., showed the infestation to be general, but light, except where trees were near packing sheds, drying grounds, or adjacent to a badly infested pear orchard. Many trees were found in such localities showing from 5 to 25 per cent of the nuts infested." Moths were reared from the Mayette, Concord, Franquette, and Parisienne varieties. So far all observations indicate that only the later broods of larvæ attack the walnuts.

It is thought that a thorough spraying in August with arsenate of lead will greatly reduce the infestation. The packing shed and drying ground should be removed some distance from the walnut grove.

The codling moth (*Agr. Jour. Cape Good Hope, 35 (1909), No. 5, pp. 585–593, fig. 1*).—This pest is said to occur in most of the districts of Cape Colony and to have spread north into or otherwise become established in Bechuanaland, the Transvaal, and the Orange River Colony.

The codling moth in the Transvaal, C. B. HARDENBERG (*Transvaal Agr. Jour., 8 (1910), No. 32, pp. 635–640, pls. 2*).—It is stated that this pest appears to have gained a foothold in the Transvaal and that wormy apples and pears, and in certain cases quinces, are becoming a common sight in the markets and fruit stores.

The cochylis, P. MAISONNEUVE, L. MOREAU, and E. VINET (*Rev. Vit., 32 (1909), Nos. 820, pp. 253–258, figs. 2; 821, pp. 291–294, figs. 2; 833, pp. 623–630, figs. 2*).—A contribution to the life history of *Cochylis ambiguella*.

[Combating the cochylis], P. MAISONNEUVE, L. MOREAU, and E. VINET (*Rev. Vit., 31 (1909), Nos. 795, pp. 261–264; 796, pp. 298–301; 797, pp. 325–331; 798, pp. 356–360; 799, pp. 385–389; 800, pp. 416–421; Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), Nos. 10, pp. 304–309; 11, pp. 327–330*).—A report of experiments with insecticides conducted during 1908.

Characteristics and habits of the bud moth, A. L. MELANDER (*Better Fruit, 4 (1910), No. 10, pp. 31, 32*).—The bud moth is thought to have first been introduced into the Northwest in 1893, as it was discovered that year at Genessee, Idaho, on nursery stock from New York. Shortly after, it was discovered in a number of districts in western Washington, and recently it has invaded many of the apple-growing districts in the eastern part of the State.

"Although the bud moth did not gain a foothold at Genessee, it has become acclimated west of the Cascades. There is scarcely an orchard, apple, plum, cherry or peach, that does not show signs of its work, so rapidly has it spread. The insect also occurs in British Columbia, western Oregon, and presumably even in California. Eastward it has not spread so rapidly. It is not considered a pest in Idaho, and Colorado fruit growers do not have to contend with it. However, in the northeastern States and in Canada it is a troublesome pest, having been introduced there from Europe many years ago."

Notes on variation in duration of similar periods of embryonic development: Its bearing on the theory of effective temperatures, A. A. GIRAULT (*Bul. Wis. Nat. Hist. Soc., n. ser., 8 (1910), No. 1, pp. 11–20, figs. 8*).—Observation of the embryonic development of the peach-borer are reported.

A case of possible parasitism in the Lepidoptera, R. H. PETTIT (*Rpt. Mich Acad. Sci., 10 (1908), p. 161*).—The author presents evidence which indicates that ***Tinea pellionella*** is parasitic on the tomato-worm (*Phlegethontius sexta*). Mention is made of one other instance of true parasitism in the Lepidoptera, that of ***Euclemensia bassettella***, which works inside one of the oak coccids of the genus Chermes.

New Central American microlepidoptera introduced into the Hawaiian Islands, A. BUSCK (*Proc. Ent. Soc. Wash., 12 (1910), No. 3, pp. 132–135*).—*Crocidosema lantana* and *Cremastobombycia lantanella*, which feed on Lantana, and *Cyane terpsichorella*, which evidently breeds more or less as a scavenger, in sugar cane, pineapples, and bananas, are described as new.

New species of North American microlepidoptera, C. R. ELY (*Proc. Ent. Soc. Wash., 12 (1910), No. 2, pp. 67–73, fig. 1*).—Two of the species here described as new, viz, *Peronia hypericana* and *Agonopterys hyperella*, were bred on ***Hypericum prolificum* at Great Falls, Va.**

Protozoan parasites of the intestine of the larva of a Ptychoptera and their action on the host, L. LÉGER and O. DUBOSCQ (*Acad. Roy. Belg., Bul. Cl. Sci., 1909, No. 8, pp. 885–902, pls. 4*).—The author here considers the occurrence and effect upon the larvæ of a tipulid of a gregarine (*Pileocephalus striatus* n. sp.), a microsporidia (*Gurleya francottei* n. sp.), a flagellate (*Crithidia campanulata*), and a spirochete.

A monograph of the Culicidæ or mosquitoes, F. V. THEOBALD (*London: British Mus. Nat. Hist., 1907, vol. 4, pp. XIX+639, pls. 16, figs. 297; 1910, vol. 5, pp. XIV+646, pls. 6, figs. 261*).—In volume 4, 160 species described since the first 3 volumes of the monograph were issued (E. S. R., 15, p. 597) are included, and 73 are described for the first time.

In volume 5 nearly a complete list, with synonyms, references to the previous volumes, and some other new references are given; old and new localities up to 1910 are also included. Twenty-one genera have been created, of which 13 are given for the first time. No less than 392 species have been described or old descriptions found since volume 4 went to press; of these the author is responsible for 106, 80 of which are first described in this work.

A contribution to the knowledge of the Diptera, A. NEIVA (*Mem. Inst. Oswaldo Cruz, 1 (1909), No. 1, pp. 69–77, pl. 1*).—Observations on the occurrence, distribution, etc., of Brazilian mosquitoes belonging to the subfamily Anophelinæ.

West Indian Cecidomyiidæ, E. P. FELT (*Ent. News, 21 (1910), No. 6, pp. 268–270*).—*Cecidomyia manihot*, reared from cassava, and *Camptoneuromyia meridionalis*, reared from flower buds of Ipomœa, are described as new.

The Mycetophilidæ of North America, Part II, O. A. JOHANNSEN (*Maine Sta. Bul. 180, pp. 125–192, pls. 4*).—In this, the second part of the work (E. S. R., 23, p. 159) the author considers the Sciophilinæ, 12 genera being recognized. Tables are given for the separation of the genera and species. A large number of forms (29 species and 1 variety) are described as new.

Comparatively little is known of their habits. "Winnertz records rearing Neoempheria, Empalia, and Mycomya from decaying beech wood, the last also from the fungi *Dædalea quercina*, and Polyporus; Sciophilæ (Lasiosoma) were obtained from the fungi *Hydnum repandum*, *Boletus scaber*, and *Dædalea quercina*."

A contribution to the knowledge of the native tabanid fauna [of Brazil], A. LUTZ and A. NEIVA (*Mem. Inst. Oswaldo Cruz, 1 (1909), No. 1, pp. 28–32*).—The authors list 35 species from the State of Espirito Santo, 39 from Xerém in the State of Rio Janerio, several additional species that occur in the last-named State, and others from the State of Minas Geraes.

The mosquitoes of the Amazon region, R. NEWSTEAD and H. W. THOMAS (*Ann. Trop. Med. and Par., 4 (1910), No. 1, pp. 141–149, pl. 1*).—In addition to the more common mosquitoes in the Amazon region a few are noted that are new or noteworthy.

A contribution to the knowledge of the Brazilian species of Simulium, A. LUTZ (*Mem. Inst. Oswaldo Cruz, 1 (1909), No. 2, pp. 124–146*).—In this revision of the black flies or buffalo gnats, 10 species and 1 variety are recognized, of which 5 species and 1 variety are described as new to science.

Robber-flies of the genus Asilus, J. S. HINE (*Ann. Ent. Soc. Amer., 2 (1909), No. 2, pp. 136–170, pls. 2*).—Forty-seven species are recognized as belonging to this genus, of which 19 are described as new. A key to the species is included.

Notes on the pupation and hibernation of tachinid parasites, W. R. THOMPSON (*Jour. Econ. Ent., 3 (1910), No. 3, pp. 283–295*).—This discussion is based upon observations made at the Gipsy Moth Parasite Laboratory.

[A dipterous parasite of an earthworm], D. KEILIN (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 26, pp. 201–203; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 6, p. 716*).—The occurrence of the larvæ of *Pollenia rudis*, a common fly, in the body cavity of an earthworm (*Allolobophora chlorotica*) is here discussed.

Trypetid galls and Eurosta elsa n. sp., E. DAECKE (*Ent. News, 21 (1910), No. 8, pp. 341–343, pl. 1*).—A new trypetid which forms galls on the roots of *Solidago juncea*, at Richmond Hill, Long Island, is described as *Eurosta elsa*. The occurrence of a gall formed by *E. comma* on the root of *S. rugosa* at Lucaston, N. J., is also noted.

Some notes on the distribution of Glossina palpalis, S. A. NEAVE (*Jour. Econ. Biol., 4 (1909), No. 4, pp. 109–113, map 1*).—This account is accompanied by a sketch map of northern Rhodesia and the adjoining country, which shows the known limits of the distribution of *G. palpalis*.

The rat fleas (Ceratophyllus fasciatus and Ctenopsylla musculi) attack man, J. C. GAUTHIER and A. RAYBAUD (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 19, pp. 941, 942*).—A continuation of the studies previously noted (E. S. R., 23, p. 261).

Prolonged conservation of the plague bacillus in fleas (Ceratophyllus fasciatus) during hibernation, J. C. GAUTHIER and A. RAYBAUD (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 19, pp. 942–944*).—The plague bacillus from rats was found to remain virulent in *C. fasciatus* for at least 45 days after imbibition when the fleas were kept at a temperature of from 0 to 5° C.

Species of fleas found on rats at Marseille, J. C. GAUTHIER and A. RAYBAUD (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 4, pp. 196–199*).—An account is given of the frequence by months from August, 1908, to December, 1909, of the species collected from *Mus rattus*, *M. alexandrinus*, and *M. decumanus*.

Of 2,276 fleas collected from *M. rattus* and *M. alexandrinus* on vessels, 2,110 were *Pulex cheopis*, 152 were *Ceratophyllus fasciatus*, 12 were *Ctenopsylla musculi*, and 2 were *Ctenocephalus serraticeps*. Of 2,424 fleas collected from *M. decumanus* on the wharves 1,250 were *C. fasciatus*, 800 were *P. cheopis*, 247 were *C. musculi*, and 127 were *C. serraticeps*. Of 4,377 fleas taken from *M. decumanus* in the city 2,210 were *P. cheopis*, 1,538 were *C. fasciatus*, 347 were *C. musculi*, and 282 were *C. serraticeps*. *Pulex irritans* was not met with in the collection from these rodents.

Monthly collections of *P. cheopis* from 1906 to 1909, here reported in tabular form, show this flea to be most numerous during August, September, and October. These are stated to be the months of the year in which the plague has been most prevalent where it has occurred in temperate regions of the northern hemisphere.

Fleas collected from squirrels from various parts of California, G. W. MCCOY and M. B. MITZMAIN (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 25 (1910), No. 22, pp. 737, 738*).—The author reports the collection of *Argopsylla gallinacea* from the California ground squirrel for the first time. The species was found on several squirrels in great numbers, always on the head, especially in the region of the mouth and eyes. *Ctenopsyllus musculi*, the blind flea of the mouse and rat, was found upon the ground squirrel for the first time in nature. *Ceratophyllus acutus*, a species capable of transferring the plague from one squirrel to another, is stated to predominate on squirrels from every county.

The life history of Callidium violaceum, J. W. SHOEBOTHAM (*Jour. Econ. Biol., 4 (1909), No. 4, pp. 114–123, figs. 12*).—This cerambycid is said to bore in wooden fences in the neighborhood of Berkhamsted and to be the source of considerable damage.

"Nothing can be done in the way of remedial measures unless the damage is detected before the larvæ make their way into the wood to pupate. If this can be done, the bark should be stripped off the posts, when the larvæ will be dislodged, and exposed to the weather, and for the birds to devour them. Where badly attacked, the fencing should be pulled down and burned during the winter, to destroy the pupæ. As a means of prevention, timber used for fencing should be creosoted or painted with tar, to prevent egg laying, it being found that when so treated it is not attacked. As mentioned by Kirby, timber used for fencing or for wood buildings should have the bark stripped off, as this will prevent egg laying and subsequent attack."

Additions to the list of Kansas Coleoptera for 1907, W. KNAUS (*Trans. Kans. Acad. Sci., 21 (1907), pt. 1, pp. 150, 151*).—A list is given of 71 species and varieties of beetles new to the Kansas list.

The food of Calligrapha bigsbyana, a chrysomelid beetle, R. W. HEGNER (*Psyche, 17 (1910), No. 4, p. 160*).—*Salix longifolia* is said to be the only plant upon which this beetle occurs in nature.

The genus Latheticus, F. H. CHITTENDEN (*Proc. Ent. Soc. Wash., 12 (1910), No. 3, pp. 135–137, fig. 1*).—A small tenebrionid beetle (*Latheticus oryzæ*), probably of oriental origin, is reported to have recently been introduced into the United States, being thus far found in Texas where it appears to be established and in Michigan where a similar establishment seems probable. It is thought that in the course of time this beetle will become quite a pest.

Notes on Oncideres texana in Georgia: Oviposition, A. A. GIRAULT (*Ent. News, 21 (1910), No. 5, pp. 226–228*).—This beetle was observed to girdle the limbs of 3-year-old pecan trees at Myrtle, Ga.

Revision of the prionides, A. LAMEERE (*Mém. Soc. Ent. Belg., 1909, No. 17, pp. 1–70*).—A continuation of the author's revision in which the genera Derancistrus, Pœcilosoma, Calogomus, Pyrodes, and Sobarus are taken up

The mango jeopardized, C. L. MARLATT (*Fla. Fruit and Produce News, 2 (1910), No. 40, p. 2*).—Attention is called to the fact that the most serious insect pest of the mango in oriental countries, the mango weevil (*Cryptorhynchus mangiferæ*), is likely to be introduced into this country with mango seed. It is considered desirable that all imported seed be inspected by competent authorities. "While the mango weevil destroys primarily the seed of this fruit, it is also believed by growers that it hastens the maturity of infested fruit and causes a greater percentage of them to fall."

Notes on Rhynchites bicolor, E. L. DICKERSON (*Jour. Econ. Ent., 3 (1910), No. 3, pp. 316, 317*).—This weevil is said to occur each year so abundantly on a *Rosa rugosa* hedge at New Brunswick, N. J., that there is scarcely a seed capsule which does not show one or more of its punctures.

Hymenoptera.—Family Chalcididæ, O. SCHMIEDEKNECHT (*P. Wytsman's Genera Insectorum. Brussels, 1909, No. 97, pp. 550, pls. 9; rev. in Proc. Ent. Soc. Wash., 12 (1910), No. 2, pp. 92–95; Science, n. ser., 32 (1910), No. 817, pp. 273–276*).—This monograph of the family Chalcididæ treats of the species included by Ashmead under the superfamily Chalcidoidea. In addition to the generic characteristics, a list is given under each of the described species and synonyms, with the references thereto and their geographical distribution. An index to the genera and species accompanies the work.

The reviews are by J. C. Crawford and A. A. Girault, respectively.

Catalogue of British Hymenoptera of the family Chalcididæ, C. MORLEY (*London, 1910, pp. 74+28*).—The author lists 148 genera and 1,424 species in this catalogue.

Bees and fruit fertilization, R. Beuhne (*Jour. Dept. Agr. Victoria, 7 (1909), No. 11, pp. 693–696, fig. 1*).—The importance of the honey bee in the fertilization of fruit is emphasized in this account.

On the habit with certain Chalcidoidea of feeding at puncture holes made by the ovipositor, L. O. Howard (*Jour. Econ. Ent., 3 (1910), No. 3, pp. 257–260*).—The chalcidoid species noted are *Tetrastichus asparagi, Aphelinus mytilaspidis*, and *A. fuscipennis*.

Two new parasitic Hymenoptera, J. C. Crawford (*Proc. Ent. Soc. Wash., 12 (1910), No. 3, pp. 145, 146*).—Two chalcidids, *Coelopisthia diacrisiæ* reared from *Diacrisia virginica* at Rocky Ford, Colo., and *Merisus mordellistenæ* reared from *Mordellistena ustulata* in Ohio and Indiana, are described as new.

A parasite of the asparagus beetle, H. T. Fernald (*Massachusetts Sta. Circ. 23, pp. 2*).—The author records observations relating to the parasitism of eggs of the asparagus beetle by a chalcidid as previously noted (E. S. R., 22, p. 557).

[The toxic effect of the food of the host upon its parasites], A. C. Morgan (*Proc. Ent. Soc. Wash., 12 (1910), No. 2, p. 72*).—The author thinks the lack of parasitism of the tobacco hornworms (*Phlegethontius* spp.) by Apanteles, when feeding upon tobacco, to be due to the toxic effect of the nicotine contained in the tobacco.

The chalcidoid parasites of the common house or typhoid fly (Musca domestica) and its allies, A. A. Girault and G. E. Sanders (*Psyche, 17 (1910), No. 4, pp. 145–160, figs. 4*).—In this third paper on the subject (E. S. R., 23, p. 666) the authors describe a new North American genus and species of the family Pteromalidæ, namely, *Muscidifurax raptor*. In addition to the house fly this parasite was reared by the authors from the puparia and, rarely, from the larvæ of the screw-worm fly and *Phormia regina*.

Biological notes are included.

Observations of the early stages of two aphidiine parasites of aphids, P. H. Timberlake (*Psyche, 17 (1910), No. 4, pp. 125–130, figs. 2*).—*Praon simulans* and *Aphidius rosæ* (?) are the species noted.

Habits of Lysiphlebus sp., C. H. Withington (*Trans. Kans. Acad. Sci., 21 (1907), pt. 1, pp. 138–140*).—The braconid here considered, which apparently represents a new species, was found to be an important parasite, at Manhattan, Kans., of *Aphis maidis*. It was found that at a mean daily temperature of 62.6° F. the parasite passed from egg to adult in an average of 16.8 days, with 13 and 23 days as extremes. A single female successfully parasitized from 1 to 147 individuals, with an average of 34. Fertilized females were applied to 8 species of plant lice, but of these only *A. cucumeris, Siphocoryne avenæ*, and *Toxoptera graminum* were parasitized. In case of the green bug under a daily mean temperature of 60° the parasite passed from egg to adult in an average of 17.5 days.

On the hymenopterous parasites of Rhynchota, C. Morley (*Zoologist, 4. ser., 13 (1909), Nos. 150, pp. 213–225; 152, pp. 309–314; 153, pp. 340–347; 155, pp. 427–437*).—An annotated list of more than 140 species of Hemiptera attacked by hymenopterous parasites, with references to the literature.

The animal kingdom.—Cynipidæ, K. W. von Dalla Torre and J. J. Kieffer (*Das Tierreich. Berlin, 1910, No. 24, pp. XXXV+891, figs. 422*).—This synopsis of the hymenopterous gall making family Cynipidæ includes a bibliography of the literature referred to, a systematic index of the family, and a plant index in addition to the general index.

How to keep bees for profit, D. E. Lyon (*New York, 1910, pp. XII+329, pls. 16, figs. 18*).—A guide to bee keeping.

Observations on the large larch sawfly (Nematus erichsoni) with suggestions for remedial and preventive treatment in infested larch woods,

J. F. ANNAND (*Quart. Jour. Forestry, 5 (1910), No. 3, pp. 203-221, pl. 1, figs. 3*).—The main object of this paper is said to be that of bringing to the notice of landowners and others interested some suggestions for dealing with the infested woods which it is thought will admit of practical application.

The insect fauna of grouse moors, P. H. GRIMSHAW (*Ann. Scot. Nat. Hist., 1910, No. 75, pp. 149-162*).—An annotated list of species collected in English grouse moors.

Practical measures for the prevention of ticks in Jamaica, H. H. COUSINS (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1910), No. 3, pp. 198-204, pl. 1*).—This is a discussion of the methods applicable in the destruction of ticks in Jamaica. A combination of paranaph, which is a soluble kerosene emulsion, and an arsenical preparation, is recommended as a spray.

Paranaph, which was first prepared by the author, is made as follows: "To 56 lbs. soft soap add 2 gal. of water. Simmer over a fire with constant stirring until all lumps have disappeared, and perfectly uniform melt has been obtained. Add 6 lbs. of crude naphthalene. Stir until dissolved. Remove the fire and add 2 imperial gallons of ordinary kerosene oil. Stir until uniform. The finished product is semisolid and dissolves readily in cold water so as to give a milky emulsion." It is said to be an efficient tick wash when used alone in the proportion of 1 qt. to 4 qts. of water, and that when combined with an arsenical and applied in the state of proper mixture in an efficient manner, this wash will kill every tick on the animal treated. The formula recommended is: Paranaph 1 pt. or 20 oz., Cooper's dip 1 oz., water 3 qts.

The fowl tick, C. W. HOWARD and R. BOURLAY (*Transvaal Dept. Agr., Farmers' Bul. 61, pp. 8, pls. 2*).—Popular accounts are given of *Argas persicus*.

A list of the ticks of South Africa with descriptions and keys, C. W. HOWARD (*Transvaal Dept. Agr., Farmers' Bul. 30, pp. 96, pls. 16*).—Previously noted from another source (E. S. R., 20, p. 857).

[Injury by the grapevine mite], J. BURNAT and P. JACCARD (*Rev. Vit., 31 (1909), Nos. 795, pp. 257-261; 796, pp. 289-292, figs. 5*).—An account of injuries to the vine by *Phyllocoptes vitis*.

A contribution to our knowledge of insecticides, C. T. MCCLINTOCK ET AL. (*Rpt. Mich. Acad. Sci., 10 (1908), pp. 197-206, chart 1*).—The results of the investigation on contact insecticides here reported have been summarized as follows:

"The insecticidal, germicidal, and toxic values (for higher animals) have little or no correlation. It is possible to determine the relative strength or value of insecticides by immersing test insects in definite strengths of the insecticide, and noting the time required to produce death. The common bedbug (*Cimex lectularius*) appears to be the most satisfactory test insect. As yet the mode of action, the way in which the contact insecticides cause the death of the insects, has not been determined. Apparently the fewer the number of spiracles, the smaller their size, and the better they are guarded by hairs or valves, the more resistant is the insect to the contact insecticides. Chemical standardization of this class of insecticides is, with our present knowledge, impossible. With 2 substances, having essentially the same chemical composition, the insecticidal values may vary enormously. Even the same substance, prepared with what are apparently unimportant chemical variations, gives widely different insecticidal values."

Analyses of samples of arsenate of lead, P. R. SCOTT (*Jour. Dept. Agr. Victoria, 7 (1909), No. 12, pp. 753-756*).—Analyses of 15 samples of arsenate of lead obtained from various sources by the government analyst and chemist for agriculture are reported.

All the samples were found to be true to name and little or no soluble arsenite was present. It was found that the moisture content in the different samples varied considerably and that in almost all cases the high moisture content was accompanied by a low arsenic acid percentage.

The use of potassium cyanid as a subterranean insecticide, T. MAMELLE (*Compt. Rend. Acad. Sci.* [*Paris*], *150* (*1910*), *No. 1, pp. 50-52*).—The author states that potassium cyanid, when injected into the ground in an aqueous solution, is decomposed by the acidity of the soil, thus setting free hydrocyanic-acid gas. He recommends that from 6 to 15 injections to the square meter be made, according to the permeability of the soil, each of from 8 to 10 cc. of a solution of potassium cyanid at a strength of 200 gm. per liter of water, or from about 1½ to 2 gm. of the salt for each injection and from 15 to 20 gm. per square meter. Injections should be made to a depth of from 10 to 20 cm.

The use in this way has advantages over carbon disulphid, as growing plants do not suffer from the treatment even when very strong doses are used. Geraniums attacked by termites and plants in pots of 1 liter capacity are not affected by 10 cc. of a 20 per cent solution of potassium cyanid, although injured by 1 gm. doses of carbon disulphid.

The effects of fumigation with hydrocyanic gas on the human system, W. W. YOTHERS (*Jour. Econ. Ent.*, *3* (*1910*), *No. 3, pp. 317-319*).—The experience of workers on the white fly investigations in Florida shows that only rarely does hydrocyanic-acid gas, as used in fumigation, cause sickness.

Tobacco as an insecticide, J. H. GOURLEY (*Ohio State Hort. Soc. Ann. Rpt.*, *42* (*1909*), *pp. 38-41*).—An address delivered before the Ohio State Horticultural Society at Columbus, in January, 1909.

The insecticide act of 1910 (*Jour. Econ. Ent.*, *3* (*1910*), *No. 3, pp. 275-282*).—A draft is given of the federal insecticide and fungicide law, previously noted (E. S. R., 22, p. 699).

Nursery inspection in Massachusetts, H. T. FERNALD (*Jour. Econ. Ent.*, *3* (*1910*), *No. 3, pp. 272-275*).—An account of this work as conducted in Massachusetts.

FOODS—HUMAN NUTRITION.

German food book (*Deutsches Nahrungsmittelbuch. Heidelberg, 1909, 2. ed., pp. VII+408*).—It is stated that this work, which is published by the German Association of Food Manufacturers and Dealers, has been quite generally revised, and that much new material has been added. The examination and valuation of foods, condiments, and commercial products, and the German laws and regulations which have to do with this industry are the subjects of which the volume treats.

Foodstuffs, III, W. R. DUNSTAN (*Colon. Rpts., Misc.* [*Gt. Brit.*], *No. 71, pp. 200-267*).—Statistical and other data are reported regarding a large number of food materials. Special mention may be made of determinations of the ash of oats of different origin, studies of the composition of starch prepared from the breadfruit tree, banana flour, honey, a sweet fibrous core of the Australian grass tree, samples of Canadian cider, coconut "water," yebb or yeheb nuts (*Cordeauxia edulis*) from Somaliland, tea, coffee, and cocoa.

According to the author, considerable interest attaches to the yeheb nuts "on account of their high nutritive value as a food. It is desirable that the cultivation of this plant should be tried in other countries, especially where a foodstuff is needed which can be grown in arid places, as appears to be the case with this plant in Somaliland. . . .

"In preparing the nuts for use as a food, it is desirable that they should be soaked in just such a quantity of water as they can absorb, since if more be

used there is danger of loss of the sugars, which would diffuse into the excess of water."

The report also contains information on the preparation and use of dried potatoes.

The influence of the environment on the milling and baking qualities of wheat in India. I, The experiments of 1907–8 and 1908–9, A. HOWARD, H. M. LEAKE and G. L. C. HOWARD (*Mem. Dept. Agr. India, Bot. Ser., 3 (1910), No. 4, pp. 191–220, map. 1*).—A number of varieties of Indian-grown wheats were included in these milling and baking tests. The work is being continued.

"Strong free-milling wheats can certainly be grown in some tracts of India, others at the present time are producing weak soft whites of poor milling qualities. It is obviously important to discover how far the profitable cultivation of high-quality wheats can be extended and whether in the tracts now growing soft grain, strong wheats can be made to retain their strength and high milling qualities."

A report by A. E. Humphries on a study of 9 samples of Indian Muzaffarnagar white wheat obtained in 1909 is included.

Bread from whole grain, M. P. NEUMANN (*Ztschr. Gesam. Getreidew., 2 (1910), Nos. 4, pp. 75–81; 5, pp. 99–107, figs. 2*).—In this digest of data the author discusses the question of the general use of bread made from whole grain. His conclusion is that this is still an unsolved problem. He believes that flour as made in modern mills is the most satisfactory breadstuff.

Commercial diabetic foods, A. MAGNUS-LEVY (*Berlin. Klin. Wchnschr., 47 (1910), No. 6, pp. 233–238; Ztschr. Gesam. Getreidew., 2 (1910), No. 4, pp. 81–88*).—The author reports a considerable number of analyses of diabetic flour, diabetic bread, and similar goods.

Composition of eggs with special reference to biological problems, V. DIAMARE (*Sienna, 1909, pp. 14; rev. in Chem. Zentbl., 1910, I, No. 19, p. 1732*).—According to the author, the greater part of the sugar in egg white and egg yolk occurs in uncompounded form. Egg white contains an amylolytic ferment which can be extracted with glycerin.

Concerning molasses produced at São Paulo, J. ARTHAUD-BERTHET, R. BOLLIGER and P. CORRÊA DE MELLO (*Bol. Inst. Agron. [São Paulo], 1909, Nos. 11, pp. 347–351; 12, pp. 405–417*).—Analyses are reported and discussed.

The occurrence of Monascus barkeri in bottled pickles, C. E. LEWIS (*Mycologia, 2 (1910), No. 4, p. 174*).—The author identified this fungus, described from eastern Asia, in pickles made in the United States.

"The spores of Monascus retain their viability for long periods of time, even when dry, so its occurrence in bottled pickles in this country is probably explained by assuming that the fungus was carried by some of the spices which were used."

Sulphur dioxid in sulphured food products, H. VAN DER WAERDEN (*Pharm. Weekbl., 47 (1910), No. 24, pp. 649–660, fig. 1*).—The author reports determinations of sulphur dioxid in a number of sulphured foods, chiefly fruits, and describes his method.

Beef, iron, and wine, A. McGILL (*Lab. Inland Rev. Dept. Canada Bul. 207, pp. 9*).—The results of the examination of 76 samples are reported.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 473, pp. 4; 474, 475, p. 1 each; 476, pp. 2; 478, p. 1; 480, pp. 2; 481, p. 1; 482, pp. 2; 483, 486, p. 1 each; 487–491, pp. 2 each; 492, p. 1; 493, pp. 2; 494, 495, p. 1 each; 496, pp. 3; 497, pp. 7; 498, pp. 6; 499, p. 1; 500, pp. 7; 501, p. 1; 504, pp. 2; 505, p. 1; 506, 507, pp. 2 each; 508, pp. 5; 509, 511, pp. 2 each; 516, p. 1; 518–520, pp. 2 each; 529, p. 1; 530–532, pp. 2 each; 534, p. 1; 535, 536, pp. 2 each; 537, p. 1;*

539, pp. 2; 541, p. 1; 542, pp. 2; 543, pp. 4; 544, pp. 5; 545, 547, p. 1 each; 548, pp. 2; 549, p. 1; 550, pp. 9; 551–554, p. 1 each; 555, pp. 3; 559–561, 563, 564, p. 1 each; 565, pp. 2; 567, p. 1; 568, 569, pp. 2 each).—These notices of judgment have to do with the misbranding of salad oil, tomato catsup, jam, bitters, macaroni, canned blueberries, sardines, spaghetti, drug products, a plaster pad, compound jam, lemon extract, codfish strips, canned corn, black pepper, canned tomatoes, vanilla extract, molasses, canned peas, coffee, preserves, jelly, vinegar, and olive oil; the adulteration of oysters, eggs and egg products, olive oil, flour (bleaching), evaporated apples, cloves, currants and raisins, lemon extract, confectionery, olives, and coffee; and the adulteration and misbranding of vanilla extract, lemon extract, buckwheat flour, lemon oil, preserves, evaporated apples, peach extract, coffee, olive oil, turpentine, spirits of camphor, and canned tomatoes.

Missouri Home Makers' Conference, edited by IVY H. SELVIDGE (*Missouri Bd. Agr. Mo. Bul., 8 (1910), No. 2, pp. 75, figs. 10, dgms. 3*).—The proceedings are given and the papers presented at the third annual meeting of the Missouri Home Makers' Conference at Columbia, December, 1909. Among other papers may be mentioned Planning and Furnishing the Farm Home, by Ivy H. Selvidge; Running Water in the Country Home, by M. F. Miller; Laundry Equipment, by Ilena Bailey; The Cooking of Vegetables, by Nelle Nesbitt; Planning Meals, by Edna D. Day; and The Relation of the Rural School to the Rural Home, by Mrs. H. C. Harvey.

The feeding of school children, J. KAUP (*Die Ernährungsverhältnisse der Volksschulkinder. Berlin, 1909, pp. 170; rev. in Hyg. Rundschau, 20 (1910), No. 12, pp. 666, 667; Soz. Praxis, 19 (1910), No. 30, p. 814*).—This publication summarizes the material collected by the Central Association for the Improvement of Social Conditions, particularly with reference to conditions in Germany. Dietary standards are suggested.

Feeding the school children, JEANETTE VAN RUYPEN (*Cooking Club Mag., 12 (1910), No. 6, pp. 63, 64*). Information is summarized regarding the efforts which have been made in a number of cities to supply meals to needy school children, and the importance of such work is discussed.

Experiments on the hydrolysis of proteins by pancreatic juice, H. MATHIEU (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 20, pp. 958–960*).—Gelatin and casein were used in the tests and showed differences in their resistance to digestive changes and the products of digestion thus yielded. The addition of bicarbonate of soda seemed to stimulate the action of the pancreatic juice on gelatin.

The influence of cooking upon the tryptic digestion of meat, J. TALARICO (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 19, pp. 932, 933*).—A brief summary of the author's artificial digestion experiments is given.

According to his conclusions, long-continued cooking of meat at 100° C diminishes the digestibility considerably. This diminution is noticeable in 1 minute with beef and fish flesh but not observed until after 3 or 4 minutes' cooking in the case of veal. The diminished digestibility disappears when the temperature of cooking is increased, beef and fish flesh cooked at 110° having the same digestibility as raw, while in the case of veal a higher temperature (140°) is required for this effect to be noticeable.

Experiments on the purin content of foods, G. BESSAU (*Untersuchungen über den Gehalt der Nahrungsmittel an Purinkörpern. Inaug. Diss., Univ. Breslau, 1909, pp. 22; rev. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 8, pp. 373, 374*).—The purin content of a large number of different materials was determined.

Eggs and caviar were shown to be purin-free while vegetables in general contained small quantities of such bases. Certain sorts show considerable quantities of purin, among which may be mentioned legumes, spinach, kohl-rabi, and some of the edible fungi. Fruits and nuts are purin-free, according to the author, as are also grains and breads with the exception of pumpernickel.

The influence of fish diet upon phosphorus, calcium, and magnesium metabolism, B. SLOWZOW (*Verhandl. Gesell. Russ. Ärzte St. Petersb., 76 (1909), p. 220; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 8, pp. 375, 376*).—Experiments with 6 persons showed that the substitution of fish for meat in the diet had practically no effect upon the resorption of phosphorus. On the other hand, the resorption of calcium oxid was diminished 5 per cent and that of magnesium oxid increased 8 per cent.

Calcium metabolism, with special reference to exophthalmic goitre, CAROLINE B. TOWLES (*Separate from Amer. Jour. Med. Sci., 140 (1910), pp. 100–113*).—In this study of the metabolism of calcium under pathological conditions, control experiments were made with a woman patient 31 years of age who showed no physical abnormality but was in the hospital on account of hysteria. A simple mixed diet was used to which calcium lactate was added.

The general conclusion was reached that "calcium given in the form of the lactate enters into the general metabolism or allows the calcium already present in the body to be utilized without loss. Given by the mouth there is no toxic effect from the administration of 20 gm. of calcium lactate over a period of 15 days."

Conclusions which have to do with the pathological condition under consideration are also drawn.

Quantitative estimation of the acid content of saliva and the influence of different foods upon this factor, R. HOLZ (*Quantitative Bestimmungen über den Säuregehalt des Speichels und den Einfluss verschiedener Nahrungsmittel auf denselben. Inaug. Diss., Univ. Würzburg, 1910, pp. 28; rev. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 8, p. 380*).—Studies of the reaction of saliva under different conditions, which included the effects of dental caries are reported.

Apparatus for determining the gaseous exchange in animals, A. LICHATSCHOW and K. GODSIKOWSKY (*Verhandl. Gesell. Russ. Ärzte St. Petersb., 76 (1909), p. 142; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 8, p. 369*).—This apparatus is a combination of the forms devised by Regnault and Reiset and by Paschutin. Special devices are described for the collection and estimation of carbon dioxid and water. Oxygen is measured directly.

Handbook of physiological methods.—Blood and its circulation, I, edited by R. TIGERSTEDT (*Handbuch der physiologischen Methodik. Leipsic, 1910, vol. 2, pt. 1, Blut und Blutbewegung I, pp. 346, pls. 7, figs. 91*).—This volume, which is a handbook of laboratory methods and a digest of literature, contains papers by C. Bohr, on the Gases of the Blood; by L. Michaëlis, on Methods of Studying Antibodies for Physiological Purposes; and by K. Bürker, on the Detection or Qualitative and Quantitative Estimation of Hemoglobins. An extended bibliography, arranged in chronological order, adds to the usefulness of the volume.

International catalogue of scientific literature. Q—Physiology (*Internat. Cat. Sci. Lit., 7 (1910), pp. VIII+1221*).—This volume, which is a part of the seventh annual issue (E. S. R., 20, p. 1168), contains material received between August, 1907, and July, 1908, on physiology, including experimental psychology, pharmacology, and experimental pathology.

ANIMAL PRODUCTION.

Analyses of some grasses and fodder plants grown in New South Wales, A. A. RAMSAY (*Agr. Gaz. N. S. Wales, 21 (1910), No. 2, pp. 115–123*).—Analyses are reported of *Paspalum dilatatum, P. virgatum, Phalaris commutata,* Rhodes grass, sheep's burnet, Italian rye grass, perennial rye grass, rib grass, Texas blue grass, guinea grass, *Panicum prolotum, Schedonorus hookerianus,* cocksfoot, *Danthonia penicillata,* wheat hay, skinless barley straw, Zealand wheat straw, white millet, yellow millet, teosinte, dry land rice (paddy), sorghum, black line Kafir corn, and ball clover.

When compared with American, German, and Queensland grasses the fat in the New South Wales grasses was slightly lower than in the American and German, but greater than in the Queensland, grasses. The nitrogen-free extract approximated that of the American and was slightly more than in the German or Queensland grasses. The amount of nitrogen was greatest in the Queensland grasses, and there was a larger percentage of the nitrogen existing as proteids in the New South Wales grasses, and a lower percentage of the nitrogen as non-proteids, than in the case of the American or Queensland grasses. Crude fiber in the New South Wales grasses was higher than in the American or Queensland. The ash of the Queensland grasses was very nearly double that of any others. Taken as a whole, the nutritive value of the New South Wales grasses was slightly inferior to that of the American.

Prickly pear and the spineless cactus for stock food, J. BURTT-DAVY (*Transvaal Dept. Agr., Farmers' Bul. 90, pp. 15, figs. 4*).—A bulletin of general information on the edible cacti and their value for feeding stock. Different methods for removing the spines are described.

Cotton-seed meal, J. B. LINDSEY (*Massachusetts Sta. Circ. 25, pp. 7, figs. 3*).—A revision of Circular 1 previously noted (E. S. R., 19, p. 771), which discusses the method of manufacture, composition, agricultural uses, and methods of sampling of cotton-seed meal, its deterioration in quality during recent years, and data as to rebates.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 477, p. 1; 533, pp. 2; 540, p. 1*).—These notices of judgment relate to the misbranding of corn chop and the adulteration and misbranding of stock feed.

Analyses of commercial feeding stuffs sold in Maryland, H. B. McDONNELL ET AL. (*Md. Agr. Col. Quart., 1910, No. 48, pp. 7*).—Analyses are reported of linseed and cotton-seed meals, gluten feed, beef scrap, meat meal, distillers' grains, cotton-seed hulls, wheat middlings, wheat bran, beet pulp, and buckwheat shorts.

Commercial feeding stuffs of Pennsylvania in 1909, J. W. KELLOGG (*Penn. Dept. Agr. Bul. 196, pp. 185*).—Analyses are reported of cotton-seed, corn, linseed, corn-cob, and alfalfa meals; gluten, molasses, hominy and mixed feeds; peanut-oil cake; beef scrap; meat meal; oats; low-grade flour; brewers' grains; beet pulp; malt sprouts; rye and corn distillers' grains; and by-products of wheat, rye, oats, buckwheat, and corn. The text and interpretation of the state feeding stuffs law are also included.

Abstracts of feeding experiments.—Analyses of feeding stuffs, B. L. HARTWELL (*Rhode Island Sta. Bul. 140, pp. 105–133*).—Continuing previous work (E. S. R., 21, p. 668), this bulletin contains abstracts of feeding experiments conducted at different stations and also reports analyses of cotton-seed, linseed, corn and alfalfa meals, gluten and hominy feeds, beef scraps, meat and bone meal, malt sprouts, brewers' grains, provender, red dog flour, dried molasses beet pulp, by-products of wheat, and mixed and proprietary feeds.

Feeding experiments with distillery slop, G. Heinzelmann, W. Völk, and J. Paechtner (*Ztschr. Spiritusindus., 33 (1910), Nos. 30, pp. 355–357, 360; 31, pp. 369, 372, 375; 32, pp. 379, 380, figs. 2*).—Four oxen of the Pinzgaur breed, 7 to 8 years old and weighing about 710 kg. per head, were fed for 131 days on a ration in which thick distillery slop furnished about one-fourth of the digestible nutrients.

Two of the 4 made an average daily gain of 1.73 kg. per head and dressed 55.98 per cent of the live weight. The other two, in addition to the feed given above, received for 99 days a daily ration of from 500 to 1,000 cc. of alcohol per head, and made an average daily gain of 1.81 kg. per head and dressed 58.15 per cent of the live weight. The weight of the heart and liver of all 4 animals was somewhat higher than normal.

Feeding experiments with distillery slop, G. Ellrodt (*Ztschr. Spiritusindus., 33 (1910), No. 37, pp. 444, 445; abs. in Deut. Landw. Presse, 37 (1910), No. 76, pp. 826, 827*).—On a ration of thin distillery slop, dried beet chips, homco, peanut cake, poppy cake, rice meal, straw, and chaff, costing 124 pfennigs (31 cts.) per head per day, 2 lots of 7 steers made average daily gains per head of 2.58 and 2.8 lbs., respectively. On a similar ration, except that the thin slop was replaced by a thick slop, 7 steers in 23 days made an average daily gain of 2.42 lbs. per head at a cost of 97.6 pfennigs per day. On a ration of thick slop, dried beet chips, chaff, and chopped straw, costing 71.4 pfennigs per head per day, 7 steers in 21 days made an average daily gain of 2.51 lbs. per head.

Concerning the value of soy-bean cake as a feeding stuff, Honcamp (*Deut. Landw. Presse, 37 (1910), Nos. 70, p. 757; 71, pp. 769, 770*).—A discussion of data obtained by different investigators who have conducted feeding tests with soy beans, that have been previously noted from other sources.

[Mineral constituents in rations for cattle], R. Escobar (*Estac. Agr. Expt. Ciudad Juárez, Chihuahua, Bol. 26, pp. 30*).—A discussion as to the value of ash constituents in animal metabolism, including the opinions of cattlemen, in answer to circular letters sent out, concerning the use of salt and saltpeter.

Sugar for fattening cattle, Dechambre and Giniéis (*Assoc. Franç. Avanc. Sci., Compt. Rend., 37 (1908), pp. 1047–1051*).—An experiment is reported in which denatured sugar was found to be equal in value to linseed meal in rations for oxen.

Finishing steers, 1907–1909, J. H. Skinner and W. A. Cochel (*Indiana Sta. Bul. 142, pp. 443–474*).—This bulletin reports experiments with different methods of finishing yearlings and 2-year-old steers. The calves used in these experiments were those used in the age experiment tests, previously noted (E. S. R., 20, p. 969; 22, p. 269). One lot of calves was kept on grass and the other in the dry lot. The full feed of grain was continued for 3 months in both lots.

The average daily gains per head during the period of 90 days for 3 different seasons were as follows: In 1907, 1.65 lbs. at a cost of 11.84 cts. per pound in the dry lot, and 1.24 lbs. at a cost of 11.17 cts. in pasture; in 1908, 1.71 lbs. at a cost of 12.7 cts. per pound in the dry lot, and 1.53 lbs. at a cost of 12.85 cts. in pasture; in 1909, 1.69 lbs. at a cost of 13.24 cts. in the dry lot, and 1.49 lbs. at a cost of 14.66 cts. in pasture. The feeds were rated as follows: Shelled corn 50 cts. per bushel in 1907 and 65 cts. per bushel in 1908 and 1909, cottonseed meal $28, hay $10, corn silage $2.50 per ton, and pasture 75 cts. per head per month.

These gains in finishing were much more expensive than those made during the first 6 months of feeding, previously noted, and were even greater than those secured with yearlings and 2-year-olds during that time, showing that the

condition of the cattle has a much greater influence than their age over the cost of gain. "Calves given a full feed of grain from November to May will make more rapid and cheaper gains, attain a higher finish, sell at a higher price, and return a greater profit if continued in dry lot than if turned on pasture for finishing. Full fed calves when turned on grass shrink in weight the first 10 days and require from 2 to 3 weeks to regain their original weight. Steers in dry lot consume a greater amount of concentrates than similar cattle on pasture."

In another experiment in finishing steers, a lot on shelled corn, cotton-seed meal, clover hay, and silage made an average daily gain per head of 2.83 lbs. for the first 4 months and 2.06 lbs. for the last 2 months. The corresponding figures for a lot on shelled corn, clover hay, and silage were 1.97 lbs. and 1.56 lbs., with another lot on shelled corn, clover hay, shredded stover, and oat straw the gain was 1.75 lbs. per day per steer during the 4 months' period, but when shredded stover and oat straw were replaced by cotton-seed meal and silage in the last 2 months the average daily gain per head was 3.06 lbs., showing that the results of the first 4 months of feeding were due to the character of the ration rather than to the individuality of the cattle.

At the close of a winter feeding experiment 3 lots on different rations were fed for 1 month a ration of shelled corn, cotton-seed meal, and clover hay. The change in rations apparently increased the rate of gain 0.7 lb. per head daily, in the lot which had previously received shelled corn, clover hay, and silage; 0.78 lb. in the lot fed shelled corn and clover hay; and 0.74 lb. in the lot previously fed shelled corn and timothy hay. The cost of gains per pound was decreased in the first lot 0.5 ct., in the second lot 0.9 ct., and in the third lot 0.65 ct. Two other similar trials also showed that nitrogenous concentrates during the final month in finishing steers of good quality produced an additional profit.

The methods of feeding, rate and cost of gains, and other data concerning the short-fed cattle at the International Show of 1908 are also given.

Sheep feeding experiments in Britain, H. INGLE (*Trans. Highland and Agr. Soc. Scot., 5. ser., 22 (1910), pp. 178-257, figs. 7*).—A summary is given of over 190 feeding trials made from 1844 to 1909. The following table gives a comparison of the results according to breed:

Comparative gains of British breeds of sheep in feeding trials, 1844–1909.

Breed.	Number of lots.	Number of sheep.	Average weekly increase per head	Average digestible matter consumed per pound of increase.
			Lbs.	*Lbs.*
Border Leicester×Blackface	13	243	2.18	5.62
Leicester×South Down	2	80	2.17	6.34
Oxford×Hampshire Down	20	183	2.58	6.44
Oxford Down	3	60	2.75	6.55
Leicester	3	50	2.09	6.72
Hampshire Down	15	251	2.88	6.75
Cotswold	10	112	2.41	6.92
Sussex	1	40	2.03	7.02
South Down	17	128	2.01	7.03
"Half-bred"	45	906	2.13	7.17
"Three parts bred"	8	128	1.91	7.84
Welsh Mountain	6	110	0.79	14.81
Average	143	2,291	2.30	7.24

On the average, sheep kept under cover increased 0.3 lb. per head per week more than those fed in the open. Sheep fed rations in which linseed meal

to the extent of 3 lbs. or more per week gave an average increase considerably higher than the rest of the lots, and each pound of increase was on the average obtained at the expense of less digestible matter. The percentage of carcass to live weight was also higher with the sheep fed on linseed cake. Cotton-seed cake appeared on the whole to give about average results, whether decorticated or undecorticated. From some of the later trials there was considerable variability in the results obtained with Indian cotton cakes. Oats on the whole were unsuccessful as a feed for fattening sheep, but in some cases fair increases were obtained. Barley gave better results than oats, though when used in large quantities it had an injurious effect on health. Whole grain was found by some observers to be relished better than barley meal. Wheat was used in but 3 lots, and in each case the results were satisfactory, the increase in live weight being much above that of the average. The results with maize were rather unsatisfactory. Malt appeared to have little or no advantage over barley. The average gain of animals fed dried grains was distinctly above that of the others. Clover hay produced a high average increase accompanied by a low consumption of total digestible matter. Meadow hay proved satisfactory when fed in small quantities in connection with concentrated food and roots. About 95 to 100 lbs. of roots per 100 lbs. of live weight per week gave the best results. Mangolds apparently proved to be better than swedes, and stored swedes better than frosted ones. Gorse, when properly prepared, was found to be capable of replacing a portion of the roots to advantage.

If certain abnormal tests are thrown out the following figures represent the average results: Weekly increase in live weight per head 2.14 lbs., weekly consumption of albuminoids per 100 lbs. live weight 1.22 lbs., weekly consumption of starch, etc., 11.5 lbs., albuminoid ratio of the rations 1:9.43, consumption of total digestible matter per pound increase 6.96 lbs., consumption of digestible albuminoids per pound increase 0.67 lb., consumption of digestible starch per pound increase 6.24 lbs. It would appear that the maximum increase, about 2.5 lbs. per week, required from 1.1 to 1.2 lbs. digestible albuminoids, and 12 to 13 lbs. nonalbuminoids expressed as starch per 100 lbs. live weight per week.

"It appears to the writer that it is probable that much larger quantities of albuminoids, in the form of linseed cake or cotton-seed cake, are often consumed in fattening than are really necessary or economical."

On the digestibility of dried potatoes and fat-free soy-bean meal in feeding experiments with swine, O. KELLNER and R. NEUMANN (*Landw. Vers. Stat., 73 (1910), No. 1-3, pp. 235-240*).—In digestion experiments with swine 2 kinds of potatoes were used, one dried and pressed in the fall, the other in the spring after the tubers had sprouted. The average digestibility of the former was organic matter 95.5 per cent, protein 26.7 per cent, nitrogen-free extract 97.9 per cent, and fiber 85.3 per cent. The average digestibility of the potatoes dried and pressed after the tubers had sprouted was organic matter 90.4 per cent, nitrogen-free extract 96.9 per cent, and fiber 72.7 per cent.

The average digestion coefficients of fat-free soy-bean meal were computed to be as follows: Organic matter 90.5 per cent, protein 94 per cent, nitrogen-free extract 92.4 per cent, and fiber 60.5 per cent.

Does lecithin influence growth? A. J. GOLDFARB (*Arch. Entwickl. Mech. Organ., 29 (1910), No. 2, pp. 255-274*).—Lecithin was extracted from hens' eggs and from sheep's brains by the Roaf and Edie method. When administered by subcutaneous injections or by way of the stomach into tadpoles, sea-urchins, cats, and guinea pigs there was no clear evidence that it acted as a stimulant.

Changes in size and form of the visceral organs of ruminants from birth to maturity, O. AUERNHEIMER (*Ztschr. Fleisch u. Milchhyg., 20 (1910), No. 12, pp. 393-396*).—Details are given of the gradual changes which took place in the

stomach, intestines, pancreas, liver, kidney, ovary, and uterus of growing sheep and cattle.

The origin and qualifications of the Ferrandaise breed of cattle, P. GILLIN (*Assoc. Franç. Avanc. Sci., Compt. Rend., 37 (1908), pp. 1054–1059*).—A description of the characteristics of this breed, formerly known as Ferrando-foréziens and officially recognized as a distinct breed in 1902. Recent endeavors to improve the breed are briefly noted.

The selection of Garonnais cattle, E. RABATÉ (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 38, pp. 361–368, figs. 2*).—A detailed description of the best types of this breed.

The cattle trade of western Canada, J. C. RUTHERFORD (*Canada Dept. Agr., Branch Live Stock Comr., Spec. Rpt., 1909, Aug., pp. 23*).—A special report on the history of the Canadian range, the present method of wintering calves, feeding and finishing mature cattle, and the outlook for the dressed meat trade.

Some facts about caracul sheep, edited by C. C. YOUNG (*Holliday, Tex. [1909], pp. 20, figs. 16*).—A collection of articles from various sources on the history and characteristics of this breed.

Russian sheep raising, J. H. GROUT (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 80, p. 68*).—This is a brief report on the decrease in wool production in European Russia as a result of the passing into peasants' hands of vast estates where large herds of sheep were wont to graze. This change has been brought about by the increased rate of land rent and the ability of the poorer classes to borrow money from the peasants' bank. The recent wool clip is reported to be fair in quality but dirty, so that the percentage of washed wool will be much reduced.

Notes on raising wool breeds of sheep in the highlands of the Sénégal-Niger region, VUILLET (*Agr. Prat. Pays Chauds, 10 (1910), No. 84, pp. 202–213*).—An account of the wool industry in this region, with suggestions concerning its better development.

The growing and preparation of wool for the South African market, J. J. MCCALL (*Natal Agr. Jour., 15 (1910), No. 2, pp. 179–186*).—A popular article on raising lambs, shearing sheep, and sorting and packing fleece.

Textile fibers of animal origin, D. ZOLLA (*Les Fibres Textiles d'Origine Animale. Paris, 1910, pp. IX+362+XII, charts 18*).—This is one of a series of popular treatises, and considers the history and present status of silk culture and wool growing, more particularly of France and the French colonies. Though the work is largely statistical, some practical matters relating to the rearing of silkworms and the management of sheep are included.

Is it desirable to spay young sows intended for fattening? HARTMANN (*Mitt. Ver. Deut. Schweinezüchter, 16 (1909), Nos. 22, pp. 317–322; 23, pp. 333–337*).—In this experiment 4 sows were spayed when 6 weeks of age, at which time their total weight was 44 kg. For 7 months this lot made smaller gains than an equal number of unspayed sows with a total initial weight of 49 kg., but at the end of the eighth month both lots weighed the same amount. Three months later, at the time of slaughtering, the spayed sows weighed 9 lbs. more than the unspayed and dressed 79.3 per cent live weight, as compared with 78.65 per cent for the unspayed animals.

The measurement of the thoracic cavity of horses, and the correct significance of the heart weight, lung weight, and thoracic cavity volume, K. L. VON LÜTSOW (*Landw. Jahrb., 39 (1910), No. 3, pp. 429–436, figs. 2*).—In answer to Müller (E. S. R., 22, p. 776) more details are given concerning the method of measuring the thoracic cavity, and there is a further discussion of the relative importance of the thoracic organs.

The measurement of the thoracic cavity of horses, etc., M. MÜLLER (*Landw. Jahrb., 39 (1910), No. 3, pp. 437, 438*).—A controversial note on the above article.

The structure and functions of the horse's back and their relation to the form and use of the military saddle, O. SCHWARZKOPF (*Jour. U. S. Cavalry Assoc., 21 (1910), No. 80, pp. 237–276, figs. 11*).—A study of the anatomy of the horse in relation to the different types of military saddles, which are illustrated and described. The bad features of each type are pointed out, and suggestions offered for their improvement. "Whatever alterations may be made in our army saddle, they will naturally be along an attempt to combine the best features of the McClellan saddle, the Whitman saddle, and the stock saddle."

The cavalry saddle, A. M. GRAHAM (*Jour. U. S. Cavalry Assoc., 21 (1910), No. 80, pp. 288–295, figs. 5*).—A description of a new saddle made for the author in order to avoid the defects of the regulation saddle, which are described in detail.

Training the polo pony, G. E. GRIFFIN (*Jour. U. S. Cavalry Assoc., 21 (1910), No. 80, pp. 277–287*).—A popular article on the selection and training of polo ponies.

Improving the breed of new forest ponies, LORD LUCAS (*Welsh Stud Book, 8 (1909), pp. XII–XXII*).—A discussion of the different types of Welsh ponies, with suggestions for their improvement by using more care in selecting the breeding stock.

My quest of the Arab horse, H. DAVENPORT (*New York, 1909, pp. XVIII+276, pl. 1, figs. 50*).—This book, which is an account of a journey undertaken to obtain pure bred Arab mares and stallions of the Anezeh tribe of Bedouins, contains much information about the Arab horse in its native country.

The regeneration of the Morgan horse, G. M. ROMMEL (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 163, pp. 14, figs. 2*).—This circular, which is based on an address before the Connecticut Valley Breeders' Association, January, 1910, outlines briefly the history of the Morgan horse, and gives an account of the best methods of reviving the breed.

"The improved type of the Morgan horse must be based on standard market requirements for horses known in our show rings by the somewhat misleading term of 'heavy-harness horses.' . . . At this time it would appear safest to advise the selection of horses of Morgan breeding which show the closest conformity to the type, and to rely on selection to increase the size. . . . The safest standard for a breeder to adopt is to confine his operations as far as possible to Morgan blood lines, rigidly eliminating every animal which is not of Morgan type, or which is unsound, or shows the slightest tendency to pace."

The Oldenburg coach horse, J. SCHÜSSLER (*Das Oldenburger elegante, schwere Rutschpferd. Hanover, 1910, pp. 95, pls. 6, figs. 56, chart 1, map 1*).—The history, characteristics, and present status of this breed are discussed.

Schwarznecker's horse breeding, revised by S. VON NATHUSIUS (*Schwarznecker's Pferdezucht. Berlin, 1910, 5. ed., rev. and enl., pp. XII+621, pls. 37, figs. 88*).—A revised and enlarged edition of this standard work on breeds, breeding, and management of horses. There is a short zoological and historical introduction. Nearly half of the work is devoted to types and breeds existing in different countries. The remainder is concerned with the topics of conformation, breeding, feeding, management, and construction of stables.

Horse secrets, A. S. ALEXANDER (*Philadelphia, 1909, pp. 64*).—These secrets relate to the buying and selling of horses, methods of feeding, and curing vices.

Examination as to soundness and certification of stallions, S. T. D. SYMONS (*Agr. Gaz. N. S. Wales, 21 (1910), No. 7, pp. 553–561, pls. 3*).—This is

the first report of governmental control in the improvement of breeding horses in New South Wales. Up to March 31, 1910, 22.6 per cent of the stallions imported were refused certificates, 82.12 per cent because of unsoundness, and 4.4 per cent were below standard. The results of the examinations have also shown that the majority of sires in New South Wales are grades.

Egg-laying competitions at Hawkesbury Agricultural College and Experiment Farm, Richmond, New South Wales, D. S. THOMPSON (*Agr. Gaz. N. S. Wales, 21 (1910), No. 7, pp. 620–639, figs. 32*).—The average results of the eighth annual test show an advance over results of previous years. The first-year hens returned a profit of 15s. over the cost of feed. The second-year hens gave a profit of 9s. 8d., and the ducks 7s. The average number of eggs per hen was 181, an increase of 40 per cent over the first test. The average number of eggs laid by the ducks was 156.5. The best pen was of the Brown Leghorn breed, which laid an average of 208.1 eggs per hen.

The encyclopedia of poultry, edited by J. T. BROWN (*London [1910], pp. 526, pls. 105, figs. 207*).—The aim of the editor of the encyclopedia, as stated, is to provide a reliable book of ready reference, upon each phase of the subject, for those who are interested in the poultry industry.

The poultry industry (*Bul. [Maine] Dept. Agr., 9 (1910), No. 3, pp. 71–98, figs. 13*).—This bulletin is devoted principally to a discussion of marketing poultry products by W. A. Brown. Among the topics treated are quality in eggs, causes of loss between producer and consumer, methods of marketing eggs in Maine, selection of birds for fattening, some of the advantages of crate fattening over pen fattening, feeds and feeding, killing, and methods of marketing poultry.

Live stock insurance (*Natal Agr. Jour., 15 (1910), No. 2, pp. 149–153*).—This contains general advice on organizing live stock mutual insurance clubs.

Fertility and sterility, E. CUBOT (*Fécondation et Stérilité. Paris, 1908, pp. VII+287*).—The topics treated in this book are the anatomy of the genital organs of domesticated animals, the ovule and ovulation, spermatogenesis, fertilization, gestation, pathology of genital organs, diagnosis and treatment of sterility, effect of food and climate on fecundity, and artificial fertilization. The work is written for practical breeders in order to show them the extreme sensitiveness of the organs of generation to their environment, and to suggest possible remedies in cases of the failure of either the male or female to breed.

Sterility, M. MORSE (*Amer. Nat., 44 (1910), No. 526, pp. 624–633*).—A review of investigations on the causes of sterility in hybrids of both plants and animals. The author believes that, as far as may be judged from studies upon the germ cells which have thus far been made, the conclusion may be drawn that whatever may be the nature of the sterility there is an "incompatibility" existing between the chromosomes of individuals of different species or varieties.

Histology of the ovary during pregnancy, O. O. FELLNER (*Arch. Mikros. Anat. u. Entwicklungsgeschichte, 73 (1909), pp. 288–305*).—The author found that the ovary was more or less active, which is contrary to the prevailing opinion. The follicules ripened slowly and but few obtained maturity. The internal secretory functions were intensified.

Determination of sex, C. and R. THESING (*Naturw. Wchnschr., 25 (1910), No. 30, pp. 465–475, figs. 9*).—A historical résumé of investigations on this subject.

Inheritance as a patent factor in the cycle of organic events, E. TEICHMANN (*Die Vererbung als Erhaltende Macht im Flusse Organischen Geschehens. Stuttgart, 1908, 2. ed., pp. 94, pls. 4, figs. 4*).—A popular work on the significance of heredity in the life of plants, animals, and man.

A biochemical conception of dominance, A. R. Moore (*Univ. Cal. Pubs., Phys., 4 (1910), No. 3, pp. 9–15, figs. 6*).—The author applies the laws of enzym reaction to the enzyms contained in the germ cell and tissues, and thus explains on chemical grounds the presence and absence hypothesis of the Mendelists. Illustrations are cited to show that two sets of reactions can not go on side by side, but may block each other, possibly by the inactivation of essential enzyms. If reactions underlying dominance are allowed to reach equilibrium, dominance is perfect, but if other reactions develop the products of which act antagonistically upon the reaction in question the dominance is incomplete and an intermediate type is produced. In the hybrid there will be only one-half the dominant parental amount of the material to be changed and the reaction products will at the end be one-half of the amount finally formed in the pure dominant, hence, we have a clear case of an intermediate hybrid.

"To sum up in a practical way the above conclusions regarding the biochemical nature of heredity, we may say that the inadequacy of the methods of investigation which have been used heretofore lies in attempting to measure only the end-products of the reactions and neglecting entirely the question of reaction velocity."

Spiegler's "white melanin" as related to dominant or recessive white, R. A. Gortner (*Amer. Nat., 44 (1910), No. 524, pp. 497–502*).—The author obtained from white rabbits, from albino silky fowls, and white Leghorn fowls a product similar to the "white melanin" which Spiegler obtained from sheep's wool and white horse hair, but states that it is a result of the action of alkalis upon keratin.

"It seems highly probable that Spiegler's 'white melanin' bears no relation to true melanins, but is a decomposition product of the keratin. A theory is advanced that dominant whites are due to the presence of an antioxydase which prevents pigment formation; recessive whites, on the other hand, have neither power to form pigments nor to inhibit the formation."

On the inheritance of the barred color pattern in poultry, R. Pearl and F. M. Surface (*Arch. Entwickl. Mech. Organ., 30 (1910), pt. 1, pp. 45–61, pls. 2, fig. 1*).—The data reported have been noted from another source (E. S. R., 23, p. 674).

The germinal disc in naturally incubated eggs of Passer domesticus, C. J. Patten (*Rpt. Brit. Assoc. Adv. Sci., 1909, pp. 506, 507*).—Observations were made of a clutch of naturally incubated eggs of the house sparrow.

The early stages were slower in development than in the case of the common fowl. "This may in part be associated with the longer time that the fowl takes to completely incubate its eggs, but it is noteworthy that the discrepancy in the time of the appearance of the corresponding stages of development in the case of the sparrow's eggs may be further bridged over if one assumes that the naturally well-constructed heat-retaining nest allowed development to proceed during the laying of the clutch, that is to say prior to the period when the mother bird took on the task of incubating."

It is stated that the method of studying avian embryology by means of artificial incubation is not always so reliable as studies under natural conditions.

DAIRY FARMING—DAIRYING.

Standards for evaporated milk, sweetened condensed milk and condensed skim milk.—Federal and state dairy laws, O. F. Hunziker (*Indiana Sta. Bul. 143, pp. 479–507, figs. 2*).—The purpose of this bulletin was to furnish information and facts concerning the possibilities "of the condensed-milk industry in its various phases, and to facilitate the drafting of just, adequate, and enforce-

able standards and laws protecting the consumer against inferior condensed milk and the manufacturer from ruinous competition of cheap products and at the same time making it possible for the manufacturer to comply with the law without impairing the marketable properties of his product."

The text of the federal food and drugs act in 1906 is given, together with comments on those portions relating to condensed milk, with reference to its effect on the condensed-milk industry. There is a discussion of the factors which influence the composition and properties of milk such as breed and individuality of the cow, period of lactation, and care and feed of the cow.

Experiments are reported on the effect of concentration on the percentage of acidity. Six lots of evaporated milk were made from the same lot of fresh milk. The fresh milk tested 0.17 per cent lactic acid. The evaporated milk, with a concentration of 1.58 parts of fresh milk to 1 part of evaporated milk, contained 0.3 per cent acid. There was a continuous rise in the percentage of acid as the product was more concentrated. When condensed at the ratio of 2.25 : 1, it contained 0.54 per cent acid.

Experiments were conducted at different seasons of the year to study the effect of degrees of concentration on the marketable properties of evaporated milk, and the results showed that in this one factory a hard curd was formed in the evaporated milk when the concentration was carried as far as 28 per cent of solids. They further showed that there was a distinct difference in the behavior of the milk at different times of the year. In spring or early summer there was a greater tendency for curdy milk than later in the season. With the June tests a sample containing 20 per cent of milk solids was free from curd, but a portion of the fat separated out. Samples containing 24.87 and 25.38 per cent, respectively, were smooth, no fat separated, and they contained no visible lumps of curd. Samples containing 28.02 and 31.99 per cent were curdy. In August, a sample containing 22.79 per cent was badly churned. Large lumps of butter floated on the surface of the liquid and the remainder of milk in the can looked like skim milk. The same was the case, though in a lesser degree, with a sample containing 24.81 per cent. A sample with 26.01 per cent was entirely smooth, with no separation of the fat nor visible curd. A sample with 27.33 per cent was not separated, but the contents were permeated with small lumps of curd, and a sample with 29.37 per cent was very curdy. In November samples with 21.12 and 23.25 per cent, respectively, were badly separated, with large lumps of butter floating on the surface. Samples with 25.48 and 26.62 per cent solids were smooth, not separated, and contained no curd. Samples with 28.23 and 30.1 per cent solids were curdy.

"The results of these experiments agree very closely with the general experience in the manufacture of evaporated milk. Milk in early summer is more difficult to process, owing to its tendency to become curdy, than milk processed at any other time of the year. . . . It has been experimentally shown that, in some localities and at certain seasons of the year, a marketable evaporated milk can not be made when the product is condensed sufficiently to contain over 24 per cent solids."

Because of these results the author discusses the desirability of changing the legal standard, and suggests the following definitions of evaporated and sweet condensed milk:

"Evaporated milk is milk from which a considerable portion of water has been evaporated and contains not less than 24 per cent of milk solids and not less than 7.5 per cent of milk fat."

"Sweetened condensed milk is milk from which a considerable portion of water has been evaporated and to which sugar (sucrose) has been added, and which

contains not less than 28 per cent of milk solids and not less than 8 per cent of milk fat."

On commercial condensed milk, H. DOLD and A. STEWART (*Bul. Soc. Chim. Belg., 24 (1910), No. 5, pp. 225-231*).—Different methods of chemical and bacteriological analysis of condensed milk were used with samples from different countries. The average number of bacteria found was about 66,400 per cubic centimeter. *Bacillus coli, B. enteritidis sporogenes*, and pathogenic bacteria were absent. Streptococci were present in some cases.

[A cryoscopic method for making powdered milk] (*Sci. Amer., 103 (1910), No. 12, p. 211*).—A note is given on a French patent devised by Lecomte and Lainville for making powdered milk, in which the action of cold is substituted for that of heat.

The milk is poured into vessels similar to those which are used for making blocks of artificial ice, and is then cooled to a few degrees below the freezing point. Suitable precautions are taken to prevent the water in the milk from freezing in a solid mass and to cause it to assume the form of fine snow The congealed milk is then placed in a centrifugal separator. The snow crystals remain in the machine, while the other parts of the milk are expelled in the form of a soft greasy paste which still contains some water. Desiccation is completed by placing the paste in a drying room heated to a moderate and uniform temperature. The method can be used for treating whole or skim milk.

New forms of milk products, L. L. VAN SLYKE (*Proc. N. Y. State Dairymen's Assoc., 1906-1908, pp. 89-110*).—A discussion of some new milk products that are increasing in commercial importance, such as milk powder, casein paints, casein adhesives, plastic materials from casein, casein products in color printing, casein foodstuffs, and medicinal preparations from casein.

Milk and dairy products, P. SOMMERFELD (*Milch und Molkereiprodukte. Leipsic, 1910, pp. 140, figs. 40*).—A brief popular treatise on the composition and properties of milk, and the management of milk from producer to consumer.

Report of milk records for the season 1908, J. SPEIR (*Kilmarnock, Scot., 1909, pp. 317*).—This contains the details of a report previously noted (E. S. R., 21, p. 376). Appended is an account of the early history of the Ayrshire breed.

The mechanism of lactation, J. P. LANGLOIS (*Presse Méd. [Paris], 1909, No. 92, pp. 817-819*).—A review of recent investigations on this topic. A bibliography is appended.

New investigations on the chemical composition of cow's milk, B. VON PONICKI (*Mitt. Landw. Inst. Breslau, 6 (1910), No. 1, pp. 33-115*).—A study of the variations in the chemical composition of the milk of 13 cows belonging to various German breeds. The yields and composition for each day are given in detail.

Additional investigations on the deviation of the fat content of cow's milk, K. INDERMÜHLE (*Jahresber. Landw. Schule Rütti, 1908-9, pp. 73-78*).—From 1902 to 1908 the average percentage of fat was 3.92 per cent in the evening milk and 3.78 per cent in the morning milk during the winter season. The corresponding figures for the summer months were 4.06 per cent in the evening and 3.78 per cent in the morning milk. It is stated that this difference between the morning and evening milk could not have been due to unequal periods of time between the 2 milkings, as in the summer time when the difference in the percentage of fat was greatest the morning and evening milkings were both 12 hours apart, whereas in the winter time 12½ hours elapsed between the evening and morning milking and 11½ hours between the morning and evening milking. The author ascribes the fat deviation to a more active metabolism in the body of the animal during the daytime.

Report of the division of creameries and dairies, G. W. McGuire (*Ann. Rpt. Bd. Health N. J., 33 (1909), pp. 143–171, pls. 2, dgm. 1*).—A report of work by the New Jersey state board of health on investigating the milk supplies of numerous municipalities and on improving the sanitary conditions of dairies.

Tuberculosis in market milk of Chicago, F. O. Tonney (*Jour. Amer. Med. Assoc., 55 (1910), No. 15, pp. 1252–1255*).—In an address at the meeting of the American Medical Association in June, 1910, the author reports details of an investigation of the milk supply of Chicago.

Inoculations were made on guinea pigs with 163 samples of milk, with the following results: "Of these, 51 caused the death of all the animals injected from acute infections within 3 weeks, before diagnosis of tuberculosis was possible. Eliminating these as lost, there remain 112 available for the series, of which 10, or 8.9 per cent, proved tuberculous. Of 144 samples of raw milk, 49 were lost within 3 weeks, leaving 96 available for consideration. Of these, 10 specimens, or 10.5 per cent, were found tuberculous. Of 19 pasteurized samples, 2 were eliminated, leaving 17 for consideration. None of the pasteurized samples caused tuberculosis in the animals injected."

Report to the local government board on American methods for the control and improvement of the milk supply, A. Eastwood (*Rpts. Local Govt. Bd. [Gt. Brit.], Pub. Health and Med. Matters, n. ser., 1909, No. 1, pp. 80*).—This is a report on the methods adopted in different States to control bovine tuberculosis, and on the action of the British local health authorities in trying to insure a sanitary supply of commercial milk.

The Manchester milk supply from a public health point of view, S. Delépine (*London and Manchester, 1910, pp. 50, charts 3*).—From the public health point of view, this paper discusses the importance of regulating the milk supply and presents in a popular manner the data and conclusions contained in an article previously noted (E. S. R., 23, p. 81).

Notes on the sterilization of milk by means of ultraviolet light, P. H. Römer and T. Sames (*Hyg. Rundschau, 20 (1910), No. 16, pp. 873–877*).—Several experiments are briefly reported on sterilizing milk with ultraviolet rays.

The effectiveness as a germicide increased with the length of time treated. The milk acquired an acrid taste at the end of 2½ hours, although it was not completely sterile at that time. The oxidase reaction was destroyed, but the Schardinger reductase reaction was not affected unless the milk was treated for a considerable length of time. The ultraviolet rays lowered the iodin number of butter, and to a less extent that of cream. Because of the destruction of the oxidase, the sterilization of milk by ultraviolet rays is considered of doubtful value from a dietetic standpoint. See also another article by the authors on page 709 of this issue.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 479, 484, 485, 502, 503, 510, 512–515, 517, 521–528, 538, p. 1 each; 546, 556, pp. 2 each; 557, 558, 562, 566, p. 1 each*).—These notices of judgment relate to the adulteration of milk and cream and to the misbranding of cheese.

The analysis of market milk, F. Hiti (*Estac. Agr. Cent. [Mexico] Bol. 27, pp. 48, pls. 3*).—A description of methods and apparatus employed by inspectors of milk and milk products.

An act to provide for the protection of dairymen.—The Babcock test (*Massachusetts Sta. Circ. 24, pp. 8, figs. 2*).—This circular contains the text of the Massachusetts law of 1901, as amended in 1907 and 1909, which provides for the inspection of the apparatus used in testing milk and milk products. Directions are given by P. H. Smith for making the Babcock test, these being a revision of an article previously noted (E. S. R., 15, p. 1003).

The technical control in dairying, R. PAPE (*Transvaal Dept. Agr., Agr. Sci. Bul. 3, pp. 8*).—The author presents formulas for estimating the yields of butter, cheese, and albumin, and other values commonly calculated by the butter and cheese maker. The use of a technical book for recording data on milk and its products is advocated.

How cream for butter-making purposes should be treated at farm and factory, and details in the process of butter making, E. GRAHAM (*Queensland Agr. Jour., 25 (1910), No. 2, pp. 48–54*).—A paper read before the state school teachers at the Queensland Agricultural College, June, 1910, which summarizes the best methods for handling cream and making butter under Australian conditions.

Composition of butter made from small fat globules, L. MARCAS and C. HUYGE (*Rev. Gén. Lait, 8 (1910), No. 14, pp. 322–325*).—Butter made from small fat globules required a longer time for churning, yielded a smaller amount of butter, and increased faster in acidity when stored at 13° C. than butter made from large globules. The composition of the butter made from small globules was water 14.2, fat 83.49, and matter insoluble in ether 2.31 per cent, and that of butter made from entire cream, water 13.8, fat 85.38, and matter insoluble in ether 0.82 per cent. There was no appreciable difference between the two butters in melting point, point of solidification, index of refraction (at 25°), or in the Crismer, Reichert-Meissl, Köttstoerfer, Hehner, and iodin values.

Dairy salts, J. C. BRÜNNICH (*Queensland Agr. Jour., 25 (1910), No. 1, pp. 30, 31, pl. 1*).—Analyses are reported of various brands of salts used in butter factories. Some samples contained undesirable amounts of impurities such as sodium sulphate, calcium sulphate, and magnesium chlorid, which would probably influence the flavor and aroma of the butter. Only one sample showed uniformly even crystals of sodium chlorid.

The microbic flora of salt as a cause of butter and cheese defects, RAPIN (*Molk. Ztg. Berlin, 20 (1910), No. 37, pp. 433, 434*).—Numerous examinations were made of brine, crude salt, and refined salt. In all cases large numbers of bacteria and molds were present. It is argued that many troubles in butter and cheese factories are probably due to the organisms present in the salt.

On the significance and effect of pure cultures in the preparation of rennet in Emmental cheese factories, G. WENGER (*Molk. Ztg. [Hildesheim], 24 (1910), Nos. 59, pp. 1111–1113; 60, pp. 1135, 1136*).—This contains a discussion of the desirability of using pure cultures in the manufacture of Emmental cheese. Answers in reply to a circular letter sent to practical cheese makers were on the whole favorable to the use of such cultures, as the fermentation was under better control though some defects could not be prevented.

Cheese making for small holders (*Bd. Agr. and Fisheries [London], Leaflet 231, pp. 8*).—Directions are given for making 2 varieties of small pressed cheeses which are to be ripened and 2 soft varieties which are to be sold fresh, all of which are suitable for those who have only a limited quantity of milk at their disposal.

Cheshire: Its cheese makers, E. DRIVER (*Bradford, England, 1909, pp. XIX+373, pls. 90*).—This book contains a history of Cheshire County and its industries with special reference to cheese making. The methods of making the cheese are described. Appendixes contain matter relating to the industry.

Annual report of the experiment station for cheese making in Lodi, C. BESANA (*Ann. R. Staz. Sper. Caseif. Lodi, 1909, pp. 160*).—This contains a general account of the work of the station, with reports of investigations which have been previously noted from other sources.

Report on the activities of the dairy institute at Proskau, KLEIN (*Ber. Milchw. Inst. Proskau, 1909–10, pp. 21*).—Analyses of milk, trials of separators, and related matters are contained in this report.

The work in dairying during the second half of the year 1909, R. W. RAUDNITZ (*Separate from Monatsschr. Kinderheilk., 9 (1910), No. 2, pp. 51*).—This is a bibliography and review of investigations of milk and milk products.

VETERINARY MEDICINE.

Proceedings of the American Veterinary Medical Association (*Proc. Amer. Vet. Med. Assoc., 46 (1909), pp. 413, pls. 9, figs. 5*).—An account of the forty-sixth annual convention.

Following the president's address are the reports of officers and committees. Under the report of the committee on diseases papers are presented by V. A. Moore on the Diagnosis of Rabies, its Spread, and Methods of Control in New York State (pp. 83–92); by J. R. Mohler on The Nature, Cause, and Prevalence of Rabies (pp. 92–109); by C. H. Higgins on Rabies in Canada (pp. 109–112); by L. E. Day on Infectious Diseases from a Veterinary Inspector's Point of View (pp. 114–117); and by A. T. Kinsley on Equine Infectious Anemia (pp. 118–126) (E. S. R., 21, p. 790).

The papers presented were as follows: Texas Fever and its Eradication, by N. Kaumanns (pp. 182–192); Milk—the Producer, the Consumer, and the Veterinarian, by M. H. Reynolds (pp. 193–217); Relation of Milk to the Public Health, by W. A. Evans (pp. 218–225); The Relation of the Agriculturist and Dairyman to Milk Hygiene, by W. D. Hoard (pp 226–237); Score Card in Dairy Regulation, by G. H. Glover (pp. 245–250); Bovine Tuberculosis Investigations, by C. M. Haring, W. A. Sawyer, and D. N. Morgan (pp. 252–260); What the Agriculturist and Veterinarian Means to the Prosperity and Health of this Nation, by W. G. Hollingsworth (pp. 263–273); Autogenic Vaccination as an Adjunct to the Operative Treatment of Quitters, Fistulæ, and Infected Wounds, by R. A. Archibald (pp. 274–277); My Experience with Bier's Obstructive Hyperemia Treatment, by H. Jensen (pp. 283–289); Exuberant Granulation, by B. F. Kaupp (pp. 290–293); Nervous Influence in the Cause and Cure of Disease, by E. A. A. Grange (pp. 294–300); Alkalometry, its Relation to Veterinary Medicine, by H. F. Palmer (pp. 301–306); A Fatal Anemic Disease among Horses, by W. B. Mack (pp. 307–321), previously noted from other sources (E. S. R., 22, p. 87); Internal Secretions, by F. Torrance (pp. 331–336); Trypanosomes and Diseases Caused by Them, by M. Herzog (pp. 337–345); Treatment of Piroplasmosis, by S. Hadwen (pp. 346–351); and Subcartilaginous Abscess of the Foot, by G. H. Berns (pp. 352–356).

Report of the New York State Veterinary College for the year 1908–9 (*Rpt. N. Y. State Vet. Col., 1908–9, pp. 100, pls. 4*).—In addition to a detailed account of the work of the year several papers by members of the teaching staff are presented, all but one of which, The Identification of Animals by Branding (pp. 78–88), by P. A. Fish, have been previously noted from other sources.

Annual reports of proceedings under the disease of animals acts, the markets and fairs (weighing of cattle) acts, etc., for the year 1909 (*Bd. Agr. and Fisheries [London], [Vet. Dept.] Ann. Rpts. Proc. 1909, pp. 118, pls. 6*).—The chief veterinary officer, S. Stockman, first reports upon the occurrence of diseases during the year, among them hog cholera, glanders, anthrax, and sheep scab. In an account of the diseases investigated attention is called to the very contagious nature of contagious granular vaginitis in cows and of the sterility following. "It seems not improbable that many continental veterinarians have been led into error regarding the relation of contagious vaginitis to episootic

abortion, because both diseases are so exceedingly prevalent that they very frequently coexist." A paper on swine fever or hog cholera, presented by the chief veterinary officer at the International Veterinary Congress at The Hague in September, 1909, is appended.

A report by A. W. Anstruther, assistant secretary of the animals division, gives a somewhat more detailed account of the occurrence of diseases of animals during the year. Colored maps which show the distribution of cases of hog cholera and sheep scab for the years 1907, 1908, and 1909 are included.

There was no recurrence of foot-and-mouth disease during 1909. The number of outbreaks of hog cholera fell from 2,067 in 1908 to 1,650 in 1909, of sheep scab from 849 to 685, and of glanders and farcy from 789 to 533. In anthrax alone was there an increase in the number of outbreaks reported, the figures for 1909 being 1,317 as against 1,105 in 1908.

A list of the orders issued by the board and statistical tables are appended.

Annual report for 1909 of the principal of the Royal Veterinary College, J. McFadyean (*Jour. Roy. Agr. Soc. England, 70 (1909), pp. 327–339, fig. 1*).—The occurrence of anthrax, glanders, hog cholera, malignant aphtha of sheep, sterility in cows, and the methods of dealing therewith are reported upon.

Report upon veterinary conditions in Saxony.—A general index of the reports 1856–1905, O. Röder (*Ber. Veterinärw. Königr. Sachsen, 1909, pp. V+83*).—This is an index to the reports issued during a period of 50 years.

Annual report of the veterinary department for 1908–9, R. J. Stordy (*Dept. Agr. Brit. East Africa Ann. Rpt., 1908–9, pp. 30–62, pls. 14*).—This report discusses the occurrence of cattle diseases and, briefly, those of the horse, sheep, pig, ostrich, and dog. A summary of microscopical examinations for the year is included.

Clinical examination of the blood of horses, bovines, mules, pigs, dogs, and sheep, J. Wetzl (*Ztschr. Tiermed., 14 (1910), No. 1, pp. 1–47; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 8, pp. 389, 390*).—The investigations reported are summarized in the following table:

Erythrocyte, hemoglobin and iron content of the blood of various domestic animals.

Kind of animal	Erythrocytes per cubic centimeter.	Hemoglobin.	Iron.
		Per cent.	*Per cent.*
Horses, normal	6,160,000– 8,692,000	62–80	0.0346–0.0512
Horse, alveolar emphysema	5,967,000		
Horses, paralytic hemoglobinemia	6,500,000–11,000,000		
Horses, chronic pyæmia	3,266,000– 4,448,000		
Horses, equine pneumonia	4,388,000–11,496,000		
Horses, dourine	4,448,000– 7,732,000		
Horse, peritonitis	10,648,000		
Horse, pernicious anemia	2,500,000		
Mules, normal	5,348,000	35–57	
Cattle, normal	7,000,000	65	0.0416
Dogs, normal	4,816,000– 8,124,000	55–60	0.0286–0.0602
Sheep, normal	8,008,000– 9,272,000	47–63	0.0350–0.0364
Hogs, normal	7,000,000		0.0356–0.0416

The results further show that the intake of large amounts of water had no influence upon the composition of the blood. On the other hand the withholding of water for from 1 to 2 days produces a thickening of the blood and a diminution in its volume, particularly where the animal is made to sweat. After giving large quantities of water the equilibrium is again restored.

A bibliography is appended.

Agglutination and conglutination, O. STRENG (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 52* (*1909*), *No. 4, pp. 523–531*).—This is a polemical article in which the author does not agree with Bail in regard to the identity of agglutinins and conglutinins, but points out the difference which exists between agglutination and conglutination, viz, that conglutinins are not bound by native bacteria. For precipitation by conglutinins the presence and binding of the complement is necessary, whereas for the action of the agglutinins the binding of alexins and bacteriolysis is a retarding factor; in other words, agglutinins combine specifically, while conglutinins do not. With the aid of conglutination bacteria can be differentiated from one another, which is not possible with agglutination. See also a previous note (E. S. R., 23, p. 583).

Observations on vegetable hemagglutinins, L. B. MENDEL (*Arch. Fisiol., 7* (*1910*), *p. 168; abs. in Zentbl. Physiol., 24* (*1910*), *No. 4, p. 145*).—Several vegetable hemagglutinins were detected. Hemagglutination and lipolysis, as well as toxicity and hemagglutination, were found to be independent of one another. Hemolysis can also come about independent of hemagglutinins.

About the faculty of the animal body for producing polyvalent precipitating sera, C. STRZYZOWSKI (*Ztschr. Physiol. Chem., 66* (*1910*), *No. 1–2, pp. 1–7*).—The author sought to determine whether the rabbit organism, after 2 or more different proteids have been injected at the same time, is capable of yielding a polyvalent serum; whether the precipitins produced are equally potent; whether on the whole they are both as potent as when only one proteid is employed; and finally, whether a polyvalent precipitating serum has any practical value.

From the results it is concluded that by the injection of equal amounts of human and bovine serum a bivalent heterogeneous serum can be produced. A trivalent serum may also be produced, but the valencies among these sera are unequal. The author gives this class of sera a forensic value.

Serum-therapy and its applications, E. LECLAINCHE (*Rev. Gén. Méd. Vét., 15* (*1910*), *No. 176, pp. 433–443*).—A discussion of the general principles, preventive serum-therapy, serovaccination, and curative sera.

Influence of bacterial endotoxins on phagocytosis, L. S. DUDGEON, P. N. PANTON, and H. A. F WILSON (*Proc. Roy. Soc.* [*London*], *Ser. B, 82* (*1910*), *No. B, 557, pp. 406–411; abs. in Chem. News, 101* (*1910*), *No. 2638, p. 280*).—Extracts were prepared from most of the common pathogenic organisms by grinding them up in the presence of sterile sand or glass, and adding a definite amount of sterile salt solution. This was then centrifugalized at high speed, and the final supernatant layer employed as the endotoxin.

As to the action of the endotoxic substance on the leucocytes, the experiments, although limited, failed to indicate that there was any direct action, as in no instance was there any appreciable variance from the control experiments.

As to the action of the endotoxic substance on the serum, the following conclusions were drawn: "(1) That the endotoxic substance was capable of exerting a specific action on the serum in a large proportion of cases; (2) that the endotoxic substance was unaffected by heat; (3) that dilution of the endotoxic substance correspondingly diminished its toxic effect upon the serum, but in a few instances, when diluted, it appeared to play the part of 'stimulin,' so that the degree of phagocytosis was far greater than in the control experiments."

A guide to parasitology, J. GUIART (*Precis de Parasitolgie. Paris, 1910, pp. XI+628, figs. 549; rev. in Parasitology, 2* (*1909*), *No. 4, pp. 435, 436*).—In part 1 of this work a general discussion is presented. Part 2 is devoted to the vegetable parasites, part 3 to the animal parasites, and part 4 to pseudo-parasites and parasites of cadavers.

Parasitology, J. L. Todd (*Reprint from Montreal Med. Jour., 38 (1909), Oct., pp. 11*).—A brief account of the parasitic diseases and the agents implicated in their transmission.

A fight against the invertebrate propagators of infectious diseases (*Bul. Off. Internat. Hyg. Pub. [Paris], 1 (1909), No. 7, pp. 545–566*).—A review of the present status of the rôle of invertebrates in disease transmission, their natural enemies, and the methods of combating them.

A review of the recent advances in our knowledge of tropical diseases, J. L. Todd (*Bul. Johns Hopkins Hosp., 21 (1910), No. 232, pp. 212–218*).—This is a paper read before the Johns Hopkins Medical Society in February, 1910.

Notes on trypanosomes of the Dimorphon group, L. E. W. Bevan and M. E. MacGregor (*Rhodesia Agr. Jour., 7 (1910), No. 5, pp. 1373–1375, figs. 2; Vet. Jour., 66 (1910), No. 421, pp. 386–390, figs. 2*).—Observations of trypanosomes obtained at Broken Hill, Northwestern Rhodesia, from a cow dying of typical trypanosomiasis are briefly reported.

The occurrence of trypanosomes in cattle in Germany, P. Knuth and G. Rauchbaar (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 31, pp. 609, 610*).—Examinations of 19 bovines from various parts of Germany showed the presence of trypanosomes in the blood of 10.

A case of sleeping sickness studied by precise enumerative methods; regular periodical increase of the parasites disclosed, R. Ross and D. Thomson (*Jour. Trop. Med. and Hyg. [London], 13 (1910), No. 12, pp. 181, 182, chart 1; abs. in Chem. News, 102 (1910), No. 2640, p. 10*).—"The enumerative methods referred to consist of modes of detecting blood parasites when very scanty, and of counting them accurately. The methods have been applied to a case of sleeping sickness in the clinic of Professor Ross in Liverpool for 73 days continuously, and have shown that the numbers of *Trypanosoma gambiense* in this patient's blood undergo remarkable periodical variations about every 7 to 8 days. The authors state that, so far as they can ascertain, though the numbers of trypanosomes had been known previously to vary from time to time, the regular periodicity revealed in their case appears to have been overlooked, possibly owing to insufficient methods of counting. The authors report that numerous parallel researches are being conducted, and give a chart."

Second series of experiments on treatment of surra in camels, A. S. Leese (*Jour. Trop. Vet. Sci., 5 (1910), No. 3, pp. 397–410*).—A continuation of the work previously noted (E. S. R., 22, p. 785).

On the transmission of African Coast fever to healthy animals through intraperitoneal inoculation with the spleen and portions of the spleen of sick animals, K. F. Meyer (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 5, pp. 374–379, pl. 1, fig. 1*).—Previously noted from another source (E. S. R., 22, p. 186).

Theileria parva, the parasite of East Coast fever in cattle, G. H. F. Nuttall and H. B. Fantham (*Parasitology, 3 (1910), No. 2, pp. 118–129, pl. 1, figs. 2*).—A report of observations on stained preparations.

Argas reflexus and its parasitism of man, H. Benoit-Bazille (*Mém. Soc. Zool. France, 22 (1909), No. 3–4, pp. 261–280, pls. 3*).—A summarized account of the occurrence and habits of *A. reflexus* and of its attacks upon man. A list of some 35 references is appended.

The degenerative appearances observed in Piroplasma canis and in Trypanosoma brucei following upon drug treatment, G. H. F. Nuttall (*Parasitology, 3 (1910), No. 2, pp. 202–209, figs. 2*).—The author considers these degenerative changes of importance in that they may help to distinguish normal from abnormal parasites in untreated animals.

The endoparasites of Australian stock and native fauna, Georgina Sweet (*Proc. Roy. Soc. Victoria, n. ser., 21 (1909), No. 2, pp. 454–527, pl. 1*).—The investigation of which this article forms the first record, "aims at making a systematic and thorough inquiry into the nature of the internal parasites infesting Australian animals, both native and domesticated, and then into the life history and conditions of increase and spread of these injurious forms."

Part 1 consists largely of a list of the parasites previously recorded, their host or hosts, habitat, the recorder or recorders, and the reference or references. Part 2 is devoted to an account of new and unrecorded species. A nematode (*Triodontophorus intermedius*) taken from the stomach of a horse is described as new.

Coccidiosis of cattle and horses, J. Reichel (*Amer. Vet. Rev., 37 (1910), No. 1, pp. 47–49*).—In 1908 the author's attention was called to a cow on a farm in Montgomery County, Pa., which was suffering wtih all the symptoms of chronic bacterial dysentery. The cow died within a short time and the clinical diagnosis of chronic bacterial dysentery was not confirmed at autopsy or in subsequent examinations in the laboratory of specimens.

Examinations of rectal scrapings from the cattle and later of feces taken from the rectum of all the cattle, horses and goat on the farm, some 63 in number, showed the presence of bodies, in smears stained as for acid-fast bacilli, which varied from rounded to oval in shape, taking on the red stain. They appeared most abundant in cattle, although several of the horses showed them in large numbers in the feces.

"Unstained the bodies are seen rounded and oval in shape, 2.5 to 5 microns in size, of a definite outline, many having a double walled appearance. Inner structure can be seen, which is well brought out in those stained with iron-hemotoxylin. The shape, outline, inner structure and presence of the bodies in the epithelial cells is conclusive proof that they are coccids. They are smaller than the coccids (2.5 by 5 microns) that are known to infest cattle in foreign countries. It is believed that this coccidium is pathogenic for cattle and capable of producing a form of chronic dysentery. Although the coccids were found in the feces of the goat and horses on the infected farms, no symptoms have been observed in either goat or horses."

Malta fever, A. Delmer (*Rec. Méd. Vét., 87 (1910), No. 15, pp. 531–541*).—A general account in which recent investigations are reviewed.

Experimental studies on rabies, A Marie (*L'Étude Expérimentale de la Rage. Paris, 1909, pp. XII+371+XII, pl. 1, figs. 11*).—This is a brief treatise on the most important experimental work with rabies up to 1909. It includes both the pathology and therapeutics.

Combating tuberculosis by the state, R. Ostertag (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 1–2, pp. 1–19*).—The author draws attention to the necessity of state control of the spread of tuberculosis, and lays particular stress upon the various forms of tuberculosis to be considered when exercising this control.

A contribution to the study of bovine renal tuberculosis, K. Büchli (*Tijdschr. Veeartsenijk., 37 (1910), No. 8, pp. 255–259; abs. in Vet. Rec., 23 (1910), No. 1155, p. 127*).—The investigations conducted led the author to conclude that many tuberculous cattle have renal foci to such a degree that bacilli are excreted in the urine, and that it is often possible to demonstrate this by injecting the deposit from the centrifuged urine into guinea pigs.

Critical remarks in regard to the occurrence of latent tubercle bacilli in the lymphatic glands, E. Joest (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 1–2, pp. 131–140*).—Latent tubercle bacilli do not occur in the lymphatic glands of bovines and hogs affected with generalized tuberculosis.

The value of the proteolytic reaction, J. VASS (*Orvosi Hetilap, 1908, No. 24, pp. 403, 404; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 28, pp. 567, 568*).—The proteolytic reaction for differentiating tuberculous from nontuberculous pus, while not applicable in every case, will undoubtedly determine whether or not the process is recent or chronic. The red color with Millon's reagent and positive proteolysis of the nutrient media with nontuberculous pus and the negative results with tuberculous pus are obtained sufficiently often to warrant the use of the test.

About tuberculosis serum and tuberculosis serovaccine, W. G. RUPPEL (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 25, pp. 495, 496*).—A résumé of the standards for the various tubercle bacilli products utilized in diagnosing and immunizing.

Pyemic arthritis and the use of nuclein solution in its treatment, J. H. JEFFERSON (*Amer. Vet. Rev., 37 (1910), No. 3, pp. 365–368*).—The case here reported made a good recovery following the use of nuclein.

A study of the mode of action of gastrotoxin and the healing of gastrotoxic ulcers, C. BOLTON (*Jour. Path. and Bact., 14 (1910), No. 4, pp. 418–431, pl. 1*).—The author has previously demonstrated that on immunizing a rabbit with gastric cells from a guinea pig or rabbit, the serum from this immunized animal, when injected into a guinea pig's peritoneum, produced a generalized toxemia with a necrosis of the mucosa of the stomach. This work deals with the way that the necrotic changes are produced and the changes which subsequently occur in the ulcers under normal and pathological conditions.

Tests in regard to the so-called mother vaccination substances against calf mortality (white scours and calf pneumonia) and against white scours and swine plague, F. M. SCHMITT (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 1–2, pp. 71–96*).—Tests to ascertain the value of the substances employed for vaccinating pregnant mothers for the purpose of conferring immunity on the offspring are reported.

The results obtained with the white scour bacillus extract and 91 bovines, with 60 hogs and the vaccine against swine plague, and a number of control animals which were injected with a 0.5 per cent aqueous solution of carbolic acid were negative.

The author also draws attention to the fact that many of the vaccines put on the market by manufacturers of biological products are insufficiently tested both in the laboratory and in practice.

Observations of the rectal temperature of healthy cattle and a contribution to the question of predetermination of the time of birth with the cow, E. WEBER (*Deut. Tierärztl. Wchnschr., 18 (1910), Nos. 10, pp. 143–146; 11, pp. 157–162; 12, pp. 173–177; abs. in Vet. Rec., 22 (1910), No. 1139, p. 726*).—The results of extensive observations reported have been summarized as follows:

The bovine rectal temperature rises after eating, the average rise being 0.45° F. The essential factor in determining the degree of elevation in individuals is the muscular activity involved in eating. Draughts of cold water do not influence the rectal temperature in cattle; neither does milking. Brisk movement for a quarter of an hour causes a rise in temperature averaging 0.9°.

The rectal temperature of the cow rises during pregnancy, at first slightly, but very markedly during the last month of the period. The average rise during pregnancy, taking the evening temperature as a basis, is 1.6°. This high temperature begins to fall, suddenly, markedly, and continuously, from 52 to 15 hours (28 hours on an average) before calving. During the hours and days following parturition, the temperature under normal circumstances shows a slight undulatory movement, due to the absorption of katabolic products.

During the final period of advanced pregnancy in the cow, the frequency of the heart is greatly accelerated.

The daily fluctuation of the temperature in the cow is less in animals fresh in milk than in those advanced in pregnancy. The former show a maximum range of temperature of 1.6° with an average of not quite 1°; in the latter, the maximum is just over 2°, and the average 1.4°. The average temperature of nonpregnant cows is from 100.4° to 103.1°, but in cows advanced in pregnancy, temperatures of from 103.1° to 104.9°, in the absence of symptoms of illness, are physiological. Healthy cattle under 6 months old may, in rare cases, show temperatures as high as 104°. In estimating the significance of the bovine temperature it is, therefore, necessary to pay due regard to the time and circumstances of its observation.

A bibliography of 42 titles is appended.

Examination of the rectum of bovines, H. GEBAUER (*Die Rektale Untersuchung beim Rinde. Inaug. Diss., Univ. Bern, 1908, pp. 128, pls. 2*).—The author divides his work into an anatomical and a technical part. The anatomical portion considers the general anatomy of the abdominal cavity and its contents and points out the variations from the normal. The technical part treats of the methods of examination, the various factors to be considered when making the examination, the indications for conducting the rectal examination, and finally, the results of the palpatory examination of the various organs through the rectum.

Torsio uteri with premature pains, A. TÖPFER (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 28, p. 563*).—A description of an obstetrical case with an East Friesian cow, in which unmistakable signs (lasting about 8 hours) indicated an early accouchement. A manual examination showed a three-quarter turn of the uterus on its long axis and from right to left. After turning back 21 times the torsion was fully eliminated. A normal delivery took place 10 days thereafter.

The "toeing out" of the fore legs of cattle, J. KÄPPELI (*Jahresber. Landw. Schule Rütti, 1908–9, pp. 99–103, pl. 1*).—Several cases are cited in which toeing out was inherited.

Observations of cattle when feeding showed that the defect was aggravated when the cattle grazed on steep hillsides or stood in stables with slanting floors. It is stated that it can be prevented to some extent by keeping the hoofs properly trimmed, and by so constructing the stall that the bottom of the manger is somewhat higher than the floor in order that the feed can be comfortably reached without spreading the fore legs.

Anaphylactic phenomenon observed in animals during vaccination with anticharbon sera, D. ALEXANDRESCU and A. CIUCA (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 13, pp. 685–687; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 8, p. 407*).—During the immunization of cows against anthrax anaphylaxis was observed, mostly light in degree and seldom lethal.

Contagious abortion, C. E. GRAY (*Transvaal Dept. Agr., Farmers' Bul. 77, pp. 7*).—A popular account.

Theory and therapy of milk fever so-called, W. H. DALRYMPLE (*Amer. Vet. Rev., 37 (1910), No. 3, pp. 349–355*).—A discussion of the present status of our knowledge of this affection.

Experiences with vaccination against foot-and-mouth disease, C. TERNI (*Bul. Agr. [Milan], 44 (1910), No. 15, pp. 3, 4*).—The results of 1,744 vaccination experiments with milch cows, bulls, young steers, heifers, and oxen are reported, mostly with milch cows and at 36 different establishments.

Scab and its eradication, C. E. GRAY (*Transvaal Dept. Agr., Farmers' Bul. 76, pp. 7, pl. 1*).—A popular account.

The eradication of the cattle tick (Margaropus annulatus), D. E. SALMON (*Amer. Vet. Rev., 36 (1910), No. 6, pp. 679-682, fig. 1*).—The author describes a method of freeing pastures of ticks through a combination of rotation and dipping. Three enclosures are made use of in this system.

Cattle dipping tanks (*Agr. Jour. Cape Good Hope, 37 (1910), No. 1, pp. 33-37, pl. 1, figs. 6*).—Dipping tanks are described and plans given for their construction.

Report on the disease known as "bluetongue" in sheep, H. WATKINS-PITCHFORD (*Natal Dept. Agr. Bul. 13, pp. 23, pls. 2, charts 8*).—A general account, in which the results of inoculation experiments are included.

Braxy or bradsot in sheep, MILBRADT (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 28, pp. 562, 563*).—Out of a herd of 500 sheep 10 died from bradsot or braxy. The pathological findings on autopsy were practically negative.

The bacterial flora of the intestines of the lamb, with particular reference to the bacteria of the hog cholera group, P. ANDREJEW (*Arb. K. Gsndhtsamt., 33 (1910), No. 2, pp. 363-376*).—The author examined the intestinal contents of 300 animals and found, when working according to the Drigalski method, that in 51 instances blue colonies were obtained. Of the 51 strains 12 had the cultural and biological characteristics of the hog cholera bacillus group, while the remaining 39 were transitional types lying between the *Bacillus coli* and paratyphoid bacillus.

Experimental transmissibility of variola of young pigs, I. PŒNARO (*Arhiva Vet., 7 (1910), No. 1, pp. 7-9, pl. 1; abs. in Vet. Rec., 23 (1910), No. 1157, p. 156*).—The author's conclusions are as follows:

"The variola of young pigs is transmissible. The blood and the pus of the vesicles are virulent. The virus does not grow upon ordinary culture media. The spirochetæ found in the ulcers have no relation with the disease, but merely represent an accidental infection."

The veterinary control of swine plague and hog cholera, R. OSTERTAG (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 3-4, pp. 195-213*).—A critical discussion as to the individuality of hog cholera and swine plague, and the methods for combating the same.

Spirochætæ in lesions affecting the pig, J. A. GILRUTH (*Vet. Jour., 66 (1910), No. 423, pp. 528-532*).—An account of the occurrence of spirochetes in lesions of somewhat diverse character as observed in Victorian pigs.

A new hog parasite (*South. Planter, 71 (1910), No. 9, pp. 920-922, fig. 1*).—The larvæ of a bot fly which had cut its way from the side of the neck into the larynx and there fixed itself securely in such position as to close completely the windpipe and thus cause the death of the hog has been found by B. H. Ransom of this Department to belong to an apparently undescribed species of Œstrus. The species is reported to occur in Virginia and West Virginia.

Pathogenesis of the accidents observed in horses during immunization against meningitis, BRIOT and DOPTER (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 24, pp. 10-13*).—The accidents are provoked by the toxic principle contained normally in the serum of the horse.

The Strauss reaction for the diagnosis of glanders, B. L. ARMS (*Jour. Amer. Med. Assoc., 55 (1910), No. 7, pp. 591-593*).—"In the diagnosis of glanders by the Strauss method it is better to use more than one guinea pig. Before inoculating it is well to make a microscopic examination as a guide to dosage. A culture from the swab often aids in the early diagnosis. Pigs should be kept under observation for a month, and if a lesion of any kind is present, autopsy should be performed and cultures made."

The sero-diagnosis of glanders, W. PFEILER (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), Nos. 3–4, pp. 328–353; 5–6, pp. 465–482*).—This is a critical discussion of the evolution of the processes for the serum diagnosis of glanders and the methods utilized for this purpose at the present day.

A contribution to the knowledge of South African horse sickness and the methods of combating it, G. REINECKE (*Beiträge zur Kenntnis und Bekämpfung der Südafrikanischen Pferdesterbe. Inaug. Diss., Univ. Bern, 1909, pp. 88, pl. 1, figs. 2*).—This summarized account of horse sickness includes the details of investigations conducted by the author in Southwest Africa. A bibliography of 54 titles is appended.

A contribution to the knowledge of the experimental behavior of the virus of horse sickness with respect to the natural mode of infection, REINECKE (*Ztschr. Veterinärk., 22 (1910), No. 2, pp. 76–80*).—An experimental horse injected subcutaneously with 2 cc. of an extract from ticks, collected in the infected district of German Southwest Africa (diluted with equal amounts of physiological salt solution), succumbed to the disease 13 days later.

Notes on a fever in horses simulating horse sickness, A. THEILER (*Transvaal Agr. Jour., 8 (1910), No. 32, pp. 581–586*).—A further account of what has been referred to as "ephemeral fever."

Boca rajada, G. HAASE (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 28, pp. 562, 563, figs. 3*).—This is an equine disease occurring on the Pacific Coast of South America, chiefly among horses about 1 year old.

The disease manifests itself by an inflammation of the mucous membranes of the mouth, accompanied by small blisters which contain a yellowish-white, clear aqueous fluid. These blisters are chiefly situated on the posterior cartilage of the tongue. At times they enlarge, become confluent, and burst, and then leave painful, reddened spots unprotected by epithelium. The excoriated areas on the tongue often enlarge and have a tendency to extend to the angles of the lips (and often exposes the entire cheek teeth), and eventually lead to a progressive splitting of the lips. The constitutional effects are marked. The animals become emaciated, and not seldom is the disease fatal, particularly where the fauces and larynx become involved. The author was never able to detect an extension to the nose, eyes, or rectum. The disease, according to the author, occurs only where zacaton (*Panicum jumentorum*) grows. The infective agent in the blisters could not be determined. The Alsol treatment is discussed.

A microfilaria in the blood of a horse at Khartoum, A. BALFOUR (*Jour. Trop. Med. and Hyg. [London], 13 (1910), No. 7, pp. 97, 98, fig. 1*).—This is thought to be the second case in which *Filaria sanguinis equi africani* has been observed.

Epulis carcinomatosa in the dog, E. ALEXANDER (*Berlin. Tierärztl. Wchnschr., 66 (1910), No. 28, pp. 563, 564*).—Epulids, which are new formations in the gums, are rarely observed by veterinarians. The author reports his clinical and histopathological findings with a case in a dog.

The histological changes with nephritis in the dog, U. DAVIS (*Die Histologischen Veränderungen bei der Nephritis des Hundes. Inaug. Diss. Univ. Bern, 1908, pp. 31*).—The results are given of macroscopic and microscopic examinations of the kidneys of 41 dogs. Six of these were normal kidneys, 6 from cases of acute interstitial nephritis, 3 of acute parenchymatous nephritis, 1 of acute hemorrhagic nephritis, 22 of chronic indurative nephritis, 2 of edema, and 1 of renal congestion.

A case of canine toxoplasmosis observed in Turin, U. MELLO (*Bul. Soc. Path. Exot., 3 (1910), No. 6, pp. 359–363*).—The occurrence of a new pathogenic species of Toxoplasma to which has been given the name *T. canis* is discussed.

On the presence of spirochetes in a case of hemorrhagic gastro-enteritis in the dog, LUCET (*Bul. Soc. Cent. Méd. Vét., 87 (1910), No. 16, pp. 376–379, figs. 2*).—Photographs taken of the spirochetes concerned accompany the account.

Preliminary report on a new piroplasm (Piroplasma gibsoni n. sp.) found in the blood of the hounds of the Madras Hunt and subsequently discovered in the blood of the jackal (Canis aureus), W. S. PATTON (*Bul. Soc. Path. Exot., 3 (1910), No. 4, pp. 274–280, figs. 2*).—"This piroplasm differs markedly in structure from *Piroplasma canis;* it is much smaller and is chiefly seen as a delicate ring of blue staining protoplasm; the pairs of large pyriform bodies so characteristic of *P. canis* have never been seen." The method by which *P. gibsoni* is transmitted in nature has not yet been discovered.

The author also reports the discovery of two other species of Piroplasma, one in the blood of the Indian mongoose and the other in the blood of the spotted deer.

Cutaneous filariasis in a dog, S. N. MITTER (*Jour. Trop. Vet. Sci., 5 (1910), No. 3, pp. 411–413, pls. 2*).—An attempt made to convey the disease, by inoculation, to a healthy dog failed.

Filaria medinensis in the dog, S. H. GAIGER (*Jour. Trop. Vet. Sci., 5 (1910), No. 3, pp. 481–483*).—Five cases in which this parasite was found in the dog in India are reported.

Contributions to our knowledge of fowl diseases, RÜTHER (*Tierärztl. Rundschau, 16 (1910), No. 5, pp. 41, 42; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 25, pp. 499, 500*).—The results of pathological and autopsical findings with cases of jaundice, spirillosis, coli infection, and leukemia are reported.

Bird pest is not a contagious disease, E. MARCHOUX (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 8, pp. 346, 347*).—The author on the basis of his experiments states that this malady is not contagious, but is probably transmitted by an intermediary host and perhaps caused by a septicemic invisible virus.

Fowl cholera (Pasteurellosis), F. RAYMOND (*Jour. Trop. Vet. Sci., 5 (1910), No. 3, pp. 371–396, pls. 8, charts 14*).—"The object of this paper is to demonstrate that fowl cholera exists in Bengal; to reproduce in a series of pictures the normal course of the disease in poultry and rabbits so that anyone can recognize it; and to tender some practical advice in regard to prevention and management of outbreaks in this Province."

New investigations in regard to the relation of fowl diphtheria to fowl pox, UHLENHUTH and MANTEUFFL (*Arb. K. Gsndhtsamt., 33 (1910), No. 2, pp. 288–304, figs. 3*).—A descriptive article, with the results of clinical and experimental observations which show that fowl pox and fowl diphtheria are caused by the same virus and that it is not due to a mixed infection. Typical pox lesions could not be produced on the outer skin by intravenous injection of pox or diphtheria lymph. The authors further state that for the present dove or pigeon pox and fowl pox must be considered identical.

Contributions to immunity against the so-called fowl pox, MANTEUFEL (*Arb. K. Gsndhtsamt., 33 (1910), No. 2, pp. 305–312; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 25, p. 499*).—The virus used in this work was obtained by scraping off the softened epitheliomæ, or from the characteristic membrane on the mucous membranes, and maceration of these with physiological salt solution. Chickens infected intravenously or subcutaneously with these viruses showed an immunity which lasted from 1½ to 2 years. A hypoimmune serum was also produced by extending the injections over a much longer period than is usually done, but this had no therapeutic effect when employed in repeated doses of 5 cc. and also no protective action.

Ocular douve of the fowl, C. MATHIS and M. LEGER (*Bul. Soc. Path. Exot., 3 (1910), No. 4, pp. 245–251*).—A trematode found in Tonkin in the conjunctival cul-de-sac of 6 per cent of 422 fowls examined is described as *Philophthalmus gralli*.

Body temperature of healthy and tubercular chickens and turkeys, KLIMMER and SAALBECK (*Ztschr. Tiermed., 14 (1910), No. 2, pp. 147–158; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 25, p. 499*).—The temperatures of 15 healthy chickens were taken 1,246 times in one week, and fluctuated between 40 and 42.5° C. Temperatures from 40 to 40.8° and from 42.3 to 42.5° were only seldom recorded, being chiefly within the limits of 40.9 and 42.2°, and giving an average of from 41.5 to 42°. The highest daily temperature was in the afternoon from 12 to 2 o'clock and the lowest at midnight. Race, sex, and the taking of food had no influence on the body temperature.

With 21 tuberculous chickens (1,724 measurements) the results obtained were identical with those from the normal chickens. With 2 turkeys (164 measurements) the temperature fluctuated within 39.5 and 41.5°, but the majority fell between 40.5 and 41.4°. The temperature cycle was the same in the turkeys as in the chickens.

Poisoning of poultry by common salt, F. SUFFRAN (*Rev. Gén. Méd. Vét., 13 (1909), No. 156, pp. 698–705; abs. in Jour. Compar. Path. and Ther., 23 (1910), No. 1, pp. 71–74*).—A case is reported in which fowls were poisoned by being fed a mash made of potatoes, to which salt had been added. Milk and other liquids prescribed after 13 had succumbed resulted in the recovery of the 2 remaining. Chemical analysis showed that in the 80 to 100 gm. of food contained in the crops, each fowl had taken from 10 to 14 gm. of salt.

In order to determine the minimum toxic dose of common salt, a series of experiments was made with fowls from which it is concluded that a dose of 4 gm. per kilogram of body weight is sufficient to produce death. The fact that one fowl resisted such a dose is thought to have been due to a certain degree of toleration established by previous repeated injection of smaller doses.

Contributions to the etiology of the disease resulting from feeding birds on rice, I. FUJITANI (*Arch. Internat. Pharmacod. et Thér., 20 (1910), No. 3–4, pp. 288–309*).—In view of the surmise of Schaumann[a] that the cause of beriberi in man is due to the fact that the food eaten contains too little or no nuclein phosphorus, the tests reported in this paper were conducted for the purpose of ascertaining the nature of the phosphorus compound, and to determine with chickens, pigeons, and sparrows the nature of the protective agent present in the silver skin of rice.

The birds fed only with shelled rice were found to die with the attending symptoms of motor paralysis. When fed with partly shelled rice, that is, rice having the silver skin, these symptoms did not manifest themselves. Chemical analysis showed that the shelled rice contains less phosphorus than the half-shelled rice, and that this phosphorus exists in the silver skin chiefly in the form of phytin. The greater amount of phosphorus in the half-shelled rice has evidently some relation to this compound. The phytin of the bran is not able, as the test showed, to prolong the life of the animals fed on peeled rice. The protective agent is thermolabile at 100° C, but its nature could not be determined.

About the transmission of disease organisms by fowl eggs, with a contribution to the bacteriology of the normal egg, K. POPPE (*Arb. K. Gsndhtsamt., 34 (1910), No. 2, pp. 186–221*).—From this work it appears that the normal hen's egg contains bacteria under ordinary conditions, and further, that the pollution can take place in either the developing or the completed egg. Un-

[a] Arch. Schiffs u. Tropen Hyg., 12 (1908), No. 5, p. 37.

fertilized fresh laid eggs were more often germ free than fertilised eggs, which is explained by the fact that the bacteria pass into the white or yolk during development and by way of the fallopian tube and cloaca during the process of fertilization. When 54 per cent of the eggs, some of which were fresh and others which were infected afterwards, were examined, staphylococci were found in from 60 to 70 per cent of the cases. Streptococci and bacilli were also found, but in no instance were the organisms pathogenic.

With reference to the spreading of disease by the egg shells coming in contact with feces, blood, and other dejecta of animals, the author shows that with fowl cholera and erysipelas the virus soon loses its virulency, while on the other hand the paratyphoid bacillus migrates through the shell and into the egg and also exists on shells polluted with feces for a long time.

RURAL ECONOMICS.

Farm labor in California (*Pacific Rural Press, 79 (1910), No. 24, pp. 468, 469*).—This is an outline of a report by State Labor Commissioner J. S. Mackenzie of an investigation, provided for by a special act of the legislature, which has been in progress for more than a year.

The inquiry dealt with the number of farms employing labor, the different races of laborers and the lines of agriculture in which they were engaged, the wages paid by white and Japanese farmers, statistics of the Japanese population as a whole, the standard of living of farm laborers, the methods of employing labor, the efficiency of the various races of farm laborers, the status of white laborers, and the need of introducing efficient foreign farm labor to meet existing conditions in California.

The investigations covered visits to 4,102 farms, on which it was found that the average duration of employment was less than two months in the year, that 68.3 per cent of the whites and 61.6 per cent of the Japanese were employed less than three months, and that only 16.6 per cent of the whites and 10.7 per cent of the Japanese were employed permanently. The average wage paid by white farmers to white help was \$1.38 per day with board, and \$1.80 per day without board, and to the Japanese \$1.49 and \$1.54, respectively. Japanese farmers, however, paid to Japanese laborers an average of \$1.57 per day with board and \$1.65 per day without board, showing that the Japanese were better paid by their own countrymen than by the white farmer. Notwithstanding these facts, the consensus of opinion in all parts of the State was that the white man of good character is preferable to any of the alien races, but that there is not a sufficient number of white laborers to perform the farm labor of the State. To meet agricultural labor conditions in California, therefore, it is the conviction of the growers of fruits, truck, and other crops that a sufficiency of farm labor must continue to be drawn from sources outside the United States.

The establishment of laborers on the land in England, Sweden, Denmark, Holland, and Belgium, B. SKALWEIT ET AL. (*Arch. Deut. Landw. Rats, 34 (1910), pp. 592–616*).—This is a series of addresses delivered at the thirty-eighth general meeting of the German Agricultural Council held at Berlin, February 15–18, 1910.

The papers deal generally with agrarian conditions in the countries mentioned, with particular reference to recent government interest in the solution of the problems relating to rural depopulation and repopulation. Recent legislation having for its object the settlement of laborers on the land through government aid is reviewed, and the economic and social results of the movement are pointed out. The general conclusion of the speakers was that the most practical solution of the agricultural labor problem from the economic

point of view is for the State to assist the farm laborer to become the owner of a small holding, since the sense of ownership is one of the strongest ties for retaining the rural population on the land.

The papers are followed by a discussion.

The economic limits of intensive culture in agriculture, B. SKALWEIT (*Die Ökonomischen Grenzen der Intensivierung der Landwirtschaft. Berlin, 1909, pp. 76*).—The results of investigations as made by the author from an examination of the accounts as kept on 35 excellently managed farms in middle and north Germany are reported.

The outlook for Vermont farming, E. S. BRIGHAM (*Ann. Rpt. Comr. Agr. Vt., 1 (1909), pp. 155–163*).—The author reviews agricultural conditions in Vermont and believes that the outlook for the future is hopeful if there can be a better organization of the farms resulting in more economic production of goods, more cooperation and united effort on the part of farmers in the purchase of supplies and sale of products, better roads as means of communication, and a broader education in the schools and in the technique of agriculture.

A New York farm bureau (*Breeder's Gaz., 58 (1910), No. 2, p. 59*).—Notes are given on the organization and lines of work planned by a farm bureau organized and conducted by the Binghamton Chamber of Commerce for locating farm laborers and encouraging agriculture in southern New York.

Cooperation among farmers, E. M. TOUSLEY (*1910, pp. 16*).—The ethical principles involved in cooperation are discussed in this address, delivered before the thirty-seventh annual meeting of the New Jersey State Board of Agriculture at Trenton, January 19–21, 1910.

Why agricultural cooperation often fails (*Wallaces' Farmer, 35 (1910), No. 31, p. 1043*).—The causes of failure mentioned in this article are the unwillingness of cooperators to employ men of business ability and pay the market price for it, to follow the leaders of their own choosing and cooperate with them irrespective of personal likes or dislikes, and to forego present and temporary advantage for the sake of future and more permanent advantage.

Report of the Irish Agricultural Organization Society, Limited, T. A. FINLAY and R. A. ANDERSON (*Rpt. Irish Agr. Organ. Soc., 1909, pp. 113*).—Detailed statistical data and discussions of the work of the affiliated cooperative organizations for the year ended June 30, 1909, are given. The number of societies on that date was 893, as compared with 941 in the preceding year (E. S. R., 20, p. 1196), but this apparent decrease is due to the fact that 83 societies were dropped from the register because they did not furnish evidence of activity to the general society. The organization now includes 358 creameries, 172 agricultural societies, 270 credit, 25 poultry, 12 flax, 36 home industries, 3 beekeepers, and 13 miscellaneous societies, and 4 federations.

Agricultural associations in France, D. B. MASON (*Daily Cons. and Trade Rpts. [U. S.], n. ser., 1 (1910), No. 16, pp. 201–203*).—Notes are given on the organization and work of the two principal cooperative unions of agricultural societies in France, with a discussion of the influence these societies have exerted under the stimulus of government aid to promote the prosperity of agriculture in France.

Farmer leagues in Germany, A. W. THACKARA (*Weekly Cons. and Trade Rpts. [U. S.], 1 (1910), No. 18, pp. 817–822; Mo. Cons. and Trade Rpts. [U. S.], 1910, No. 357, pt. 2, pp. 51–56*).—This article describes the organization, work, and economic results of the two leading agricultural cooperative unions of farmers' societies in Germany, namely, the Imperial Union of Agricultural Societies and the General Union of Agricultural Societies. The data reported and discussed include the number of affiliated societies, membership, assets and liabilities, loans, deposits of members, cost of administration, value of purchases,

reserve funds, etc. It is said that the significance of these agricultural cooperative unions in Germany "lies in their successful advocation of honest business dealing, in their insistence on cash payments and on economy in operating expenses, in their struggle against usury and deception, in the business and moral training which they give to the lower and middle classes, and in the happy combination of progressive principles and brotherly feeling which they stimulate."

Notes on the marketing of vegetables and fruits in Holland, particularly in Westland, [and] on the truck-gardening association of Tourlaville (*Min. Int. et Agr.* [*Brussels*], *Off. Rural. Avis aux Cult., 2. ser., 1910, No. 5, pp. 45, pls. 9*).—Methods of marketing fruits and vegetables, transportation facilities and freight rates to England, and the organization and work of the Tourlaville truck-gardening association are described in this bulletin.

[Agricultural credit in the provinces of Marches and Umbria] (*Bol. Min. Agr., Indus. e Com.* [*Rome*], *9 (1910), Ser. A, No. 1, pp. 13–22*).—The regulations for carrying out the law of January 2, 1910 (E. S. R., 22, p. 795), promoting the development of agricultural credit in Marches and Umbria, are reported.

Native societies for providing grain and credit in French West Africa (*Quinz. Colon., 14 (1910), No. 13, pp. 469, 470*).—An account of the means employed for encouraging the development of native mutual-credit societies. The purposes of such societies are to provide for seed grains at the proper times of planting, to purchase necessary implements, to aid members in sickness and cases of accident, and to guard against the effects of droughts, floods, diseases, and other natural risks.

The mutual insurance of live stock (*Jour. Bd. Agr. Brit. Guiana, 3 (1910), No. 4, pp. 192–194*).—A discussion of the principles and methods under which mutual live stock insurance societies are organized and conducted.

How can a live-stock insurance society be established and managed? C. Weilandt (*Arch. Deut. Landw. Rats, 34 (1910), pp. 719–802, figs. 4*).—This paper discusses the economic significance of live-stock insurance, forms of organization, different kinds of insurance, propositions and preparations for the establishment of societies, premiums, reserve funds, by-laws and regulations, registering the stock, bookkeeping, annual reports and accountings, and other data relating to the organization and work of such societies.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 12 (1910), No. 9, pp. 65–72*).—Statistics on the condition and acreage of crops in the United States and foreign countries, the farm values and range of prices of agricultural products, and monthly receipts of eggs and poultry in the leading markets of the United States are presented and discussed.

AGRICULTURAL EDUCATION.

Proceedings of the Thirteenth Conference for Education in the South (*Proc. Conf. Ed. South, 13 (1910), pp. 352*).—At the Thirteenth Conference on Education in the South, held in Little Rock, Ark., April 6–8, 1910, the papers presented included the following:

The adjustment of the rural school to the conditions of rural life as observed in the rural schools of Page County, Iowa, J. Y. Joyner (pp. 69–76).—The author of this paper emphasizes the following points: (1) Real rural schools are not city schools in the country, (2) children taught through school agriculture are educated toward the farm instead of away from it, (3) such teaching can be done by teachers who have had no special agricultural training, (4) its success depends upon adequate, trained, experienced supervision with power for leader-

ship and inspiration, (5) patrons cooperate in such work with cordial interest, and (6) the work of the schools is stimulated by corn-growing and other prize contests, determined and awarded in annual township and county exhibits.

Education for efficiency in rural communities, A. M. Soule (pp. 101–129).—This paper is an exhaustive discussion of the problems involved in the improvement of rural education.

Agriculture in the elementary school, F. L. Stevens (pp. 219–224).—The author of this paper lays emphasis on the following general propositions: (1) The ordinary elementary teacher can teach as large a percentage of the teachable facts of agriculture as she can of the facts of history, geography, or English, (2) a text-book should be used as the basis, supplemented with available illustrative material, (3) teachers of the subject should receive special instruction in summer schools and institutes, (4) the teaching of agriculture should be required by school authorities, and (5) an itinerant supervisor should be employed to assist the efforts of the local teacher.

Agriculture in public high schools, J. J. Doster (pp. 225–233).—The author discusses the reasons for general rural indifference to school improvement and calls attention to the need of text-books in physics, biology, chemistry, mathematics, bookkeeping, and history that are adapted to rural conditions and interests and illustrate the importance of agriculture in the industrial development of the race. He suggests that country boys and girls should be encouraged to carry on a productive business in truck or fruit growing or in stock or poultry raising while studying in the rural high school. The school "should be the social center of the neighborhood," and "evening classes for the benefit of the women of the neighborhood in cooking, dress cutting and dress making, in training to care for the sick, and in the prevention of disease, might be formed."

What the college of agriculture can do to promote the teaching of agriculture in the rural schools, C. A. Keffer (pp. 233–242).—This address was presented under the following heads: (1) The place of the college of agriculture in the school system of the State, (2) college extension work in agriculture, and (3) the development among the voters of a sentiment favorable to the teaching of agriculture. The author holds that the state agricultural college should be regarded as an integral part of the public school system, and that it should take a leading position in promoting agriculture in the lower schools.

Agriculture in normal schools, D. B. Johnson (pp. 242–250).—After a general review of the rapid progress of secondary agricultural education developments in this country, the author of this paper describes particularly the instruction and practice work of Winthrop Normal and Industrial College, Rockhill, S. C., in agriculture and domestic science.

Papers were also given on What One Southern Agricultural High School Has Done, by C. A. Cobb; Community Improvement Through the School-Home, by H. T. Bailey; and Education for Economic Efficiency, by J. C. Branner.

Public school agriculture, how taught and how connected with the business of farming, D. J. Crosby (*Minn. Conserv. and Agr. Development Cong., 1910, pp. 120–126*).—This address, after dealing briefly with the general agencies for education and research as related to the conservation of natural resources, proceeds to describe more fully the agencies for secondary education in agriculture, the rapid introduction of such courses in the public schools, and the establishment of special vocational schools of agriculture and domestic science. The functions of these special schools are designated as follows: (1) To stimulate the more general introduction of agricultural teaching into the common schools, (2) to aid in the preparation of teachers, (3) to serve as vocational connecting links between the public schools and the agricultural colleges, (4) to serve as finishing schools in agriculture for those who can not attend

college, (5) to relieve the agricultural colleges of secondary and preparatory work, (6) to serve farming communities more directly than the colleges in various forms of extension work, and (7) by their limitation and number to provide for specialization to some extent along different lines of agricultural work adequately illustrated by a more complete equipment than can be provided in the ordinary high school.

Agricultural education: Its relation to the whole industry, J. M. W. KITCHEN (*Country Gent., 75 (1910), No. 3010, pp. 929, 930*).—This article is written from the standpoint of one of the trustees if Gilmanton Academy, Gilmanton, N. H., which is cited as the first institution in New England "to adopt the idea of secondary agricultural education as a local and national need of the present and the future."

The author holds that the decline of prosperity on New England farms and the present "disproportion of consumers to food producers" is due to two causes, "(1) poor judgment in forming and carrying out national plans and policies, and (2) educational mismanagement." He believes that few farmers will rally to the call for more extensive production raised by railroad presidents and city consumers, without assurance of greater profits, "as a mere matter of patriotic altruism." The problem of right rural education must be solved by centralized schools supported largely by outside aid. "As a rule this financial aid should be given by the National Government, and the more this fact is realized, the sooner will matters be in trend for a development of the future prosperity of the country."

Agriculture in the schools, A. A. BRIGHAM (*Ann. Rpt. Mo. Bd. Agr., 42 (1909), pp. 73–85*).—An address emphasizing and illustrating the feasibility of agricultural teaching in the public schools as a means of stimulating interest in other school studies. The value of special agricultural schools for those too old or backward for the regular schools is particularly pointed out.

How agriculture may be taught in the public schools, F. W. HOWE (*Ann. Rpt. Mo. Bd. Agr., 42 (1909), pp. 86–92*).—This address contains many illustrations of successful methods of developing an interest in agriculture in the public schools. The teacher is advised to put herself in the attitude of a co-learner with her pupils, and a practical program for such work is suggested. The author believes that agricultural teaching has great value for urban as well as rural schools, and that "the pedagogical, practical, social, and cultural reasons for teaching agriculture as the basic industry of mankind exist alike in all the common schools."

The course of nature study in the elementary school, F. L. HOLTZ (*Nature-Study Rev., 6 (1910), No. 7, pp. 189–192*).—In answer to the criticism often made that nature study is usually fragmentary and unorganized, the author of this paper sets forth the following principles as a guide to the construction of courses: (1) The ethical aim should not be ignored, (2) the course should give practical information adapted to the child's present interests and contacts as well as the future, (3) it should train to careful observation and logical thinking, (4) it should be adapted to the child's psychological stage of development, (5) it should go "from the familiar to the less known types" of objects, (6) it should follow the line of least resistance as to community interests and availability of illustrative material, (7) it should follow the order of the seasons in order to preserve the true setting and significance of objects studied, and therefore (8) it will always lack complete coherence from the standpoint of any one science, but there should be a reason for every element at the point where it is introduced, so that the course as a whole may "hang together logically."

Agriculture for young folks, A. D. and E. W. WILSON (*St. Paul, 1910, pp. 340, figs. 125*).—This school text on agriculture gives special attention to corn,

potatoes, hay, seed selection, farm management, live stock, farm-home sanitation, country roads, and rural cooperation. Each chapter is followed by questions and arithmetical problems on the subjects treated.

MISCELLANEOUS.

Sixteenth Annual Report of Montana Station, 1909 (*Montana Sta. Rpt. 1909, pp. 63–83*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1909, a report of the director on the work and publications of the station, and a meteorological summary of temperature, precipitation, wind direction, sunshine, and frost conditions at Bozeman, Mont., during the year.

Twentieth Annual Report of New Mexico Station, 1909 (*New Mexico Sta. Rpt. 1909, pp. 5–41, fig. 1*).—This contains the organization list, a report of the director on the work, publications, and exchanges of the station, departmental reports on the various lines of station work conducted during the year, and a financial statement for the fiscal year ended June 30, 1909. Portions of the reports of the chemist and horticulturist are abstracted on pages 710 and 733, respectively, of this issue.

Second Annual Report of the Dickinson Subexperiment Station, 1909 (*North Dakota Sta., Rpt. Dickinson Substa., 1909, pp 5–69, figs. 10, charts 7*).—This contains the organization list of the North Dakota Station and an account of the work of the Dickinson substation for 1909. The experimental work recorded is abstracted elsewhere in this issue.

Annual review of agronomy, D. Zolla (*Rev. Gén. Sci., 21 (1910), No. 18, pp. 779–792*).—This article summarizes recent researches on the action of potash salts on the growth of oats and other forage crops, the topping of cereals, the culture of cereals under dry land conditions, the influence of fertilizers on the composition of cereals, and the fight against hail and methods of defense, with an account of the work of the station of vegetable pathology at Paris.

Report of the Danish plant culture committee, H. C. Larsen (*Ber. Stat. Planteavl. [Denmark], 1909–10, pp. 151*).—The various activities of the committee during the year are described and a discussion given as to methods of experimentation and work in progress and in contemplation at the 8 Danish plant culture stations for the year 1909, with the budget of the stations for the year.

The Swedish Moor Culture Society and its activities, H. von Feilitzen (*Svenska Mosskulturfor. Tidskr., 24 (1910), No. 3, Sup., pp. 169–240, figs. 45*).—This report contains a historical sketch of the society and its organization and equipment, with a description of its buildings and experimental grounds.

Report of the Central Experimental Agricultural Institute for 1909, S. Rhodin et al. (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 3, pp. 251–278*).—Brief statements of the work of the various departments of the institute during the year are given, with a list of its publications.

Report of the agricultural department of Finland, 1908 (*Landtbr. Styr Meddel. [Finland], 1910, No. 70, pp. VI+203+3*).—This report presents the usual brief statements of the various activities of the department during the year.

NOTES

Arizona University.—President K. C. Babcock has accepted an appointment to the newly established position of specialist in higher education in the United States Bureau of Education, and has entered upon his duties.

Arkansas University and Station.—V. A. Hooper and Dr. W. M. Bruce have resigned the chairs of dairy husbandry and agricultural chemistry, respectively, to engage in private business at Clarendon, Ark.

The attendance of students upon classes in the college of agriculture has increased about 13 per cent over last year. The state fair, at Hot Springs, which is largely under the control of the college and station, met with greater success this year than at any other time in its history. The various secondary agricultural schools, with the exception of that at Magnolia, have opened with an average attendance of 100 students. These schools articulate with the college of agriculture, its dean being an advisory member of their governing boards.

Kansas College and Station.—R. J. Kinzer has resigned as animal husbandman to accept the secretaryship of the American Hereford Cattle Breeders' Association, and will enter upon his new duties January 1, 1911. J. B. Fitch (Purdue, 1910) has been appointed assistant in dairying. J. B. Parker, assistant in entomology, has resigned to accept the chair of biology in the Catholic University of America, at Washington, D. C.

Cornell University and Station—According to a recent announcement in *Cornell Countryman*, a department of forestry has been authorized. The pomology work has been separated from the department of horticulture and organized as a distinct department in charge of C. S. Wilson, as professor of pomology. Other promotions include C. H. Tuck to the professorship of extension teaching, A. R. Mann, from secretary to a professorship, with the title of secretary and professor of agricultural editing, and E. S. Savage, from instructor to assistant professor of animal husbandry.

L. B. Judson has withdrawn from teaching to give his entire time to investigation work. A. C. Beal has been appointed assistant in floriculture, Paul Work instructor and investigator in olericulture, vice L. D. Batchelor, whose resignation has been previously noted, and Mrs. Helen B. Young instructor in home economics. Assistants have also been appointed as follows: R. J. Gilmore, biology; G. R. Hill, jr., plant physiology; H. W. Anderson and C. T. Gregory, plant pathology; Sara M. Bailey, home economics; L. M. Hurd, poultry husbandry; and W. W. Fisk, dairy industry. G. E. Burnap, of the department of rural art, has resigned to accept an appointment in connection with the park system of Washington, D. C.

Oklahoma Station.—James A. Wilson, superintendent of the Murray State School of Agriculture at Tishomingo, Okla., has been appointed director.

Porto Rico Station.—The insular government has ceded to the station 200 acres of land on a mountain side above the city of Mayaguez for carrying on some work in reforesting. This is being planted to cabinet woods and fruits, especially the mango. W. C. Taylor, assistant chemist, has resigned to enter commercial work.

American Association of Economic Entomologists.—The twenty-third annual meeting of this association will be held at Minneapolis, Minn., December 28 and 29, in connection with the annual meeting of the American Association for the Advancement of Science. A joint session with the Entomological Society of America is planned for December 28.

INDEX OF NAMES.

INDEX OF SUBJECTS.

NOTE.—The abbreviations "Ala. College," "Conn. State," "Mass.," etc., after entries refer to the publications of the respective experiment stations; "Alaska," "Hawaii," and "P.R." to those of the experiment stations in Alaska, Hawaii, and Porto Rico; "Can." to those of the experiment stations in Canada, and "U.S.D.A." to those of this Department.

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